JULY, 1925

Railway Engineering and Maintenance

RAILWAY ENGINEERING AND MAINTENANCE
Published monthly by Simmons-Boardman Publishing Co., at 608 S. Dearborn St., Chicago. Subscription price: United States, Canada and Mexico, $2.00; foreign countries, $3.00 a year. Single copy, 35 cents. Entered at Chicago, Ill., as second-class matter.

The Protection of Highway Grade Crossings Is One of the Most Serious Problems of the Day.

Railway Engineering and Maintenance

Formerly the Railway Maintenance Engineer

Vol. 21 July, 1925 Number 7

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WOULD YOU LIKE TO KNOW

When an intermittent water treating plant is advantageous?

If the reclaming of second-hand lumber is justified?

What preparations are necessary for the release of a track for maintenance operations?

How loads may be supported on soils of an unstable character?

What thicknesses of shims to use when laying rail?

Answers to these and other questions will be found in this issue.

Published on the last Thursday preceding the date of issue by the

Simmons-Boardman Publishing Company, 608 South Dearborn Street, Chicago, Ill.

NEW YORK: 30 Church Street
MANDEVILLE, LA.
CLEVELAND: 6007 Euclid Avenue
WASHINGTON: 17 and H Streets, N. W.
LONDON, England: 34, Victoria St., Westminister, S. W. 1
Cable Address: Urasigmec, London
SAN FRANCISCO, 74 New Montgomery Street

Entered at the postoffice at Chicago, Ill., as mail matter of the second class.

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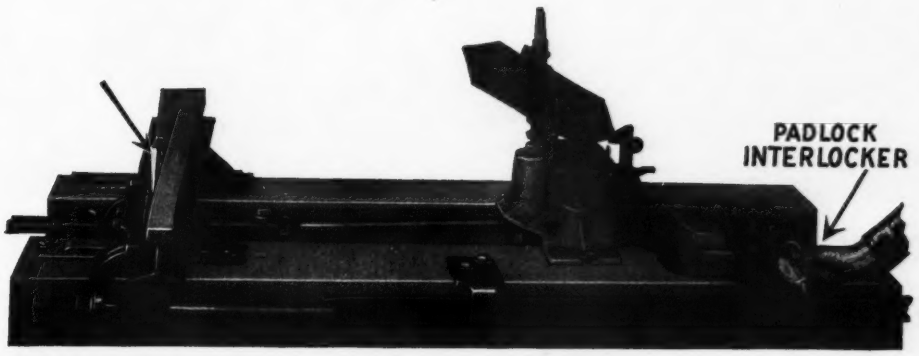
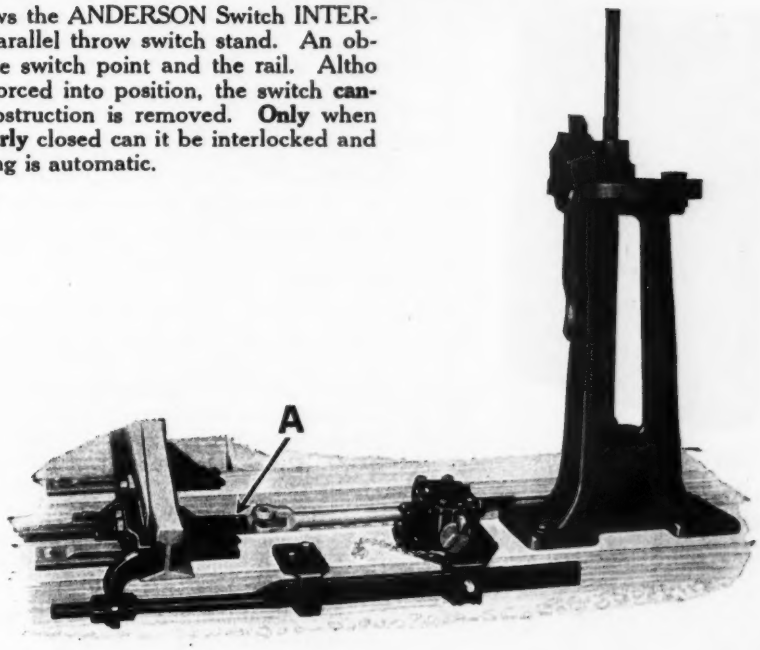
Can be used with ANY Switch Stand



The illustration above shows the ANDERSON Switch INTERLOCKER used with the Parallel throw switch stand. An obstruction exists between the switch point and the rail. Altho the switch stand lever is forced into position, the switch **cannot be locked** until the obstruction is removed. **Only** when the switch points are **properly** closed can it be interlocked and padlocked. The interlocking is automatic.



In the illustration above, the switch is closed and locked but the head rod bolt at A is missing. Ordinarily this would leave the switch unprotected but with the ANDERSON Switch INTERLOCKER, it is held absolutely safe for traffic. **It is interlocked.**

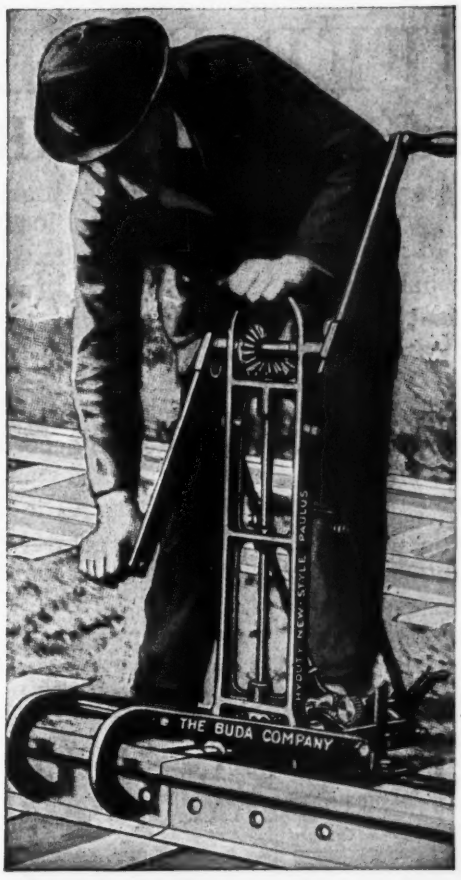
The American Valve & Meter Co. CINCINNATI, OHIO, U. S. A.

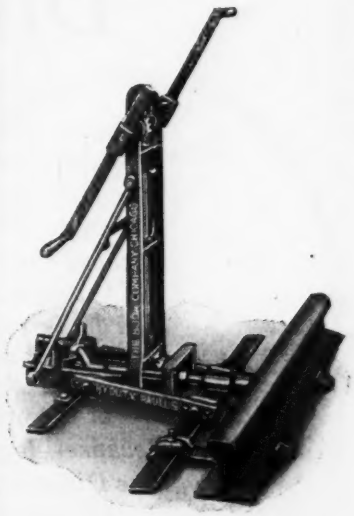
BUDA
ESTABLISHED
1881

THE *GENUINE*

Buda "Hyduty" Paulus Track Drill

Type "A"



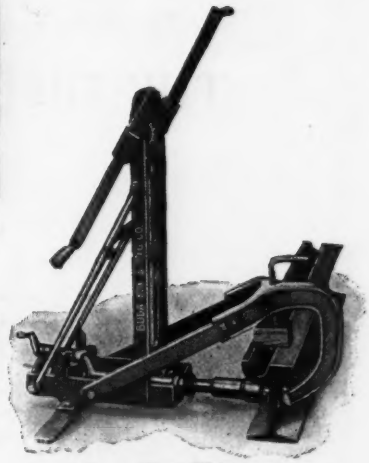


Type "C"

Type "B"

BEARINGS: Bronze bushed (both upper and lower frame.)
GEARS: Forged steel—machine-cut teeth.
FEED: Variable—two distinct feeds.
THRUST BEARING: Ball-bearing, dust-proof—reduces friction and promotes ease of operation.
HANDLES: Adjustable to use of larger size bits and heavy feed.
FRAME: Extra heavy (T section) throughout.

CATALOG ON REQUEST



Type "D"

THE BUDA COMPANY

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Railway Exchange ST. LOUIS
664 Mission Street SAN FRANCISCO
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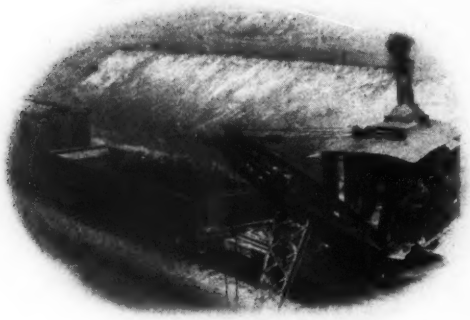


Low height—No Booming-up

Keeps the ballast clean

DIFFERENTIAL
AIR DUMP CAR

Because—it is scarcely more than seven feet high and because it is the only car which can be successfully loaded by hand.

The Differential—saves time and money when loading by machine or by hand.

Because—the body of the car is under control of the operator throughout the dumping operation.

The Differential—is not subject to the usual shock and strains that damage dump cars and cause excessive maintenance; and it is able to distribute the material according to the will of the operator.

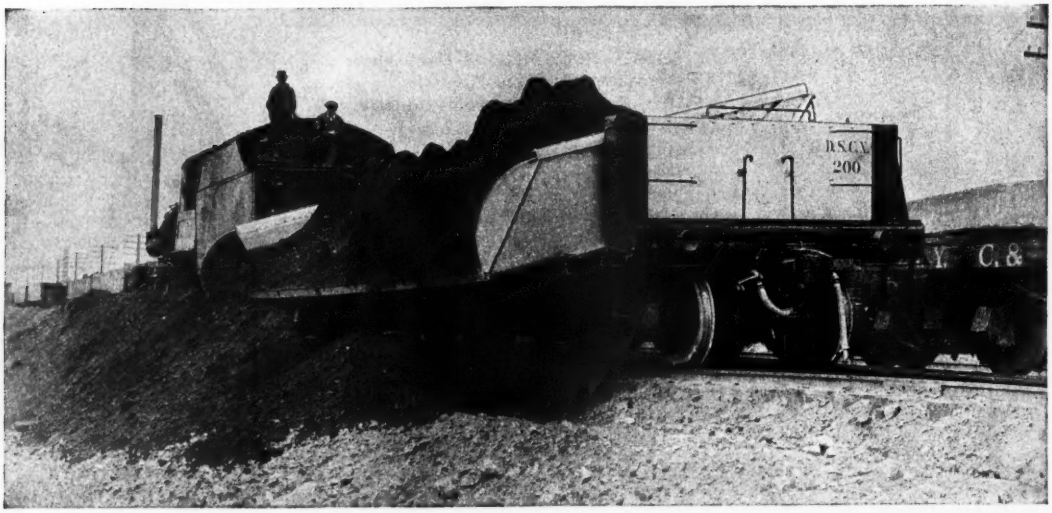
Because—it places the load well away from the track.

The Differential—does not foul the ballast and it eliminates costly shoveling and renders unnecessary in many cases the use of a spreader.

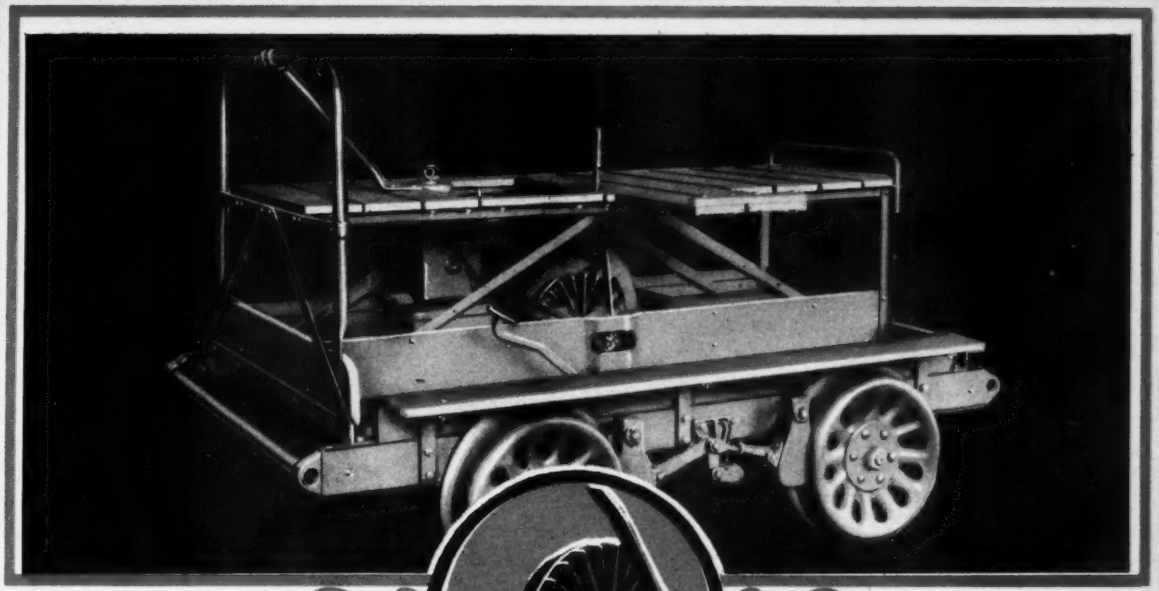
Because—it dumps to either side without any change in mechanism.

The Differential—saves time and labor on the job.

THE DIFFERENTIAL STEEL CAR CO.
FINDLAY, OHIO



Material can be dumped in desired quantities



This clutch gives positive but flexible control. The large surfaces, with cooling fins, prevent burning out

Now the engine does the work
-not the operator

Have you ever seen a section car operator tugging at a belt tightener until you wondered whether the man or the engine was furnishing the driving power?

That was the thing that Fairbanks-Morse engineers set out to eliminate in the new Sheffield 44 one-cylinder motor car—and operators of these cars will tell you that they have succeeded.

Chain drive—chain drive made possible by a perfected clutch that cannot be burned out—has done the trick. And chain drive in a car of this type means the elimination of a sliding engine base or a tension pulley that may or may not accomplish its purpose. It also means a total elimination of the delays for repairing broken belts—the delays that always seem to come at a time when they cause the most trouble.

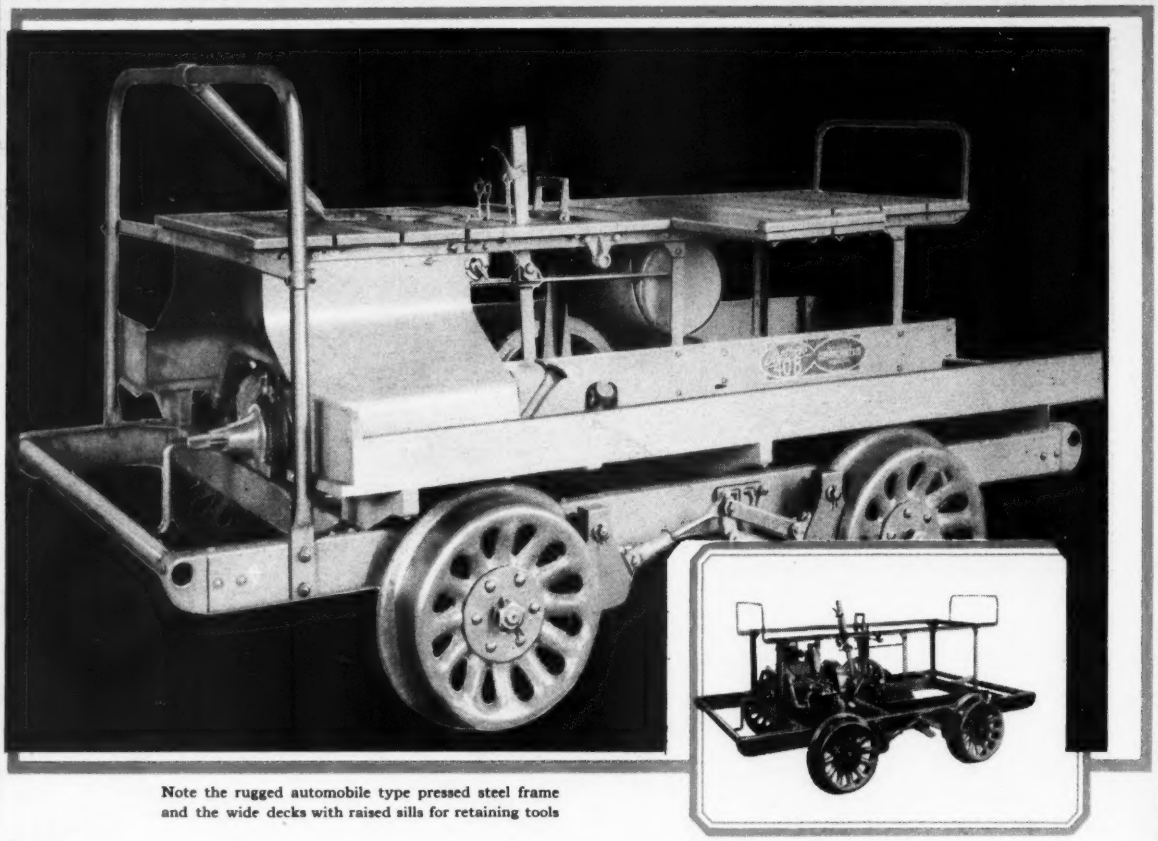
The "44" will give you a new conception of one-cylinder car development. You will find a highly perfected and fully accessible engine bolted tight to a stout, pressed steel auto-type frame—a car that gives more power at the engine and more power at the wheels—a car that is a particularly worthy addition to the complete Fairbanks-Morse line that has guided motor car development for more than thirty years.

The new "40-B"—a two-cylinder, air cooled friction drive car—is described on the next page.

FAIRBANKS-MORSE
MOTOR CARS

First on the rails —*and still first*

A778



Note the rugged automobile type pressed steel frame and the wide decks with raised sills for retaining tools

A car of known reliability
now developed to a still higher standard

Coaling Stations

The finest of equipment backed by undivided responsibility permanently guarantees every coaling station that is

built throughout by
Fairbanks-Morse

Always known for economy, low maintenance and marked reliability, the Sheffield 40 has been still further refined in a new model—the "40-B."

The engine that has been respected for "always hitting 'em off" has been developed to a point where it now represents all that is modern in automotive practice. Timken taper crankshaft bearings absorb the thrust of the friction transmission, and three-point suspension insures perfect alignment under all operating conditions.

The car is now equipped with a pressed steel auto type frame—undoubtedly the strongest ever used on a car of this kind. Cutting of the axles is eliminated by the use of Timken bearings. In short, this car is one more evidence of the leadership that began when the first motor driven section car was built more than thirty years ago by Fairbanks-Morse. Ask for bulletin information.

FAIRBANKS, MORSE & CO., Chicago

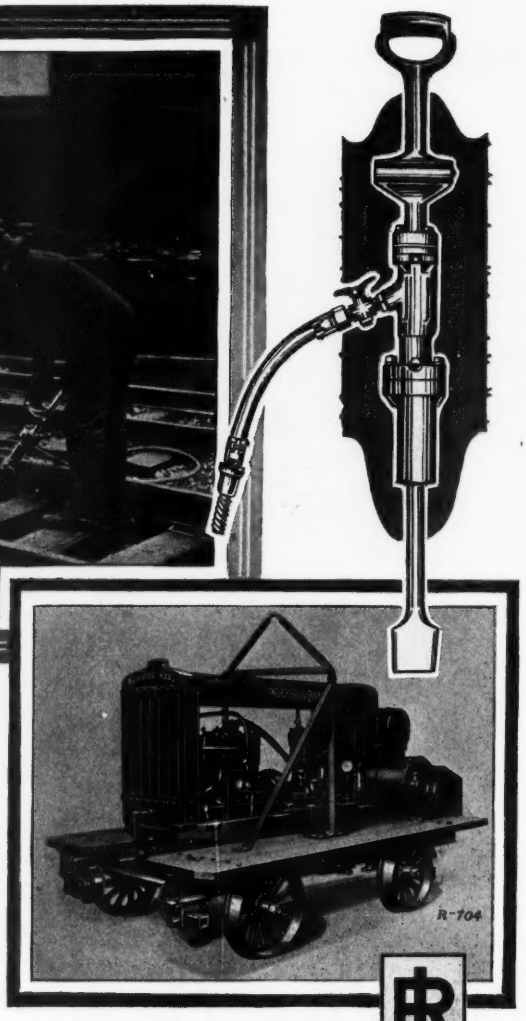
Manufacturers of railway motor cars, hand cars, push cars, velocipedes, standpipes for water and oil, tank fixtures, oil engines, steam power and centrifugal pumps, scales, complete coaling stations

24 branches in the United States, each with a service station

FAIRBANKS-MORSE
MOTOR CARS

First on the rails F M *—and still first*

Four pneumatic tie tampers at work.



Size 5x5 type twenty compressor. Operates four pneumatic tampers.

440 feet of track per day

each tie tamped on eight faces

This was the average reported by one road for the month of April. A four tool pneumatic tamping outfit was used. It was put in service on April first and operated by a gang inexperienced in pneumatic tamping.

The same gang, tamping by hand, had previously averaged only 196 feet of track per day. The work was general resurfacing, with an average lift of about 1½ in.

Ingersoll-Rand pneumatic tamping outfits not only speed up the tamping but produce a more even and uniformly tamped track, which stands up twice as long as that tamped by hand. This combination makes Pneumatic Tamping the surest way to speed up track work and at the same time reduce costs.

INGERSOLL-RAND COMPANY 11 BROADWAY NEW YORK CITY

OFFICES IN PRINCIPAL CITIES THE WORLD OVER

For Canada Refer—Canadian Ingersoll-Rand Company Limited, 260 St. James Street, Montreal, Quebec.

217TT

Ingersoll-Rand

Figure 8 test track on which cars are run until worn out to determine value of improvements before application to regular models.

Fairmont cars are tested under various loads and speeds and in all kinds of weather.

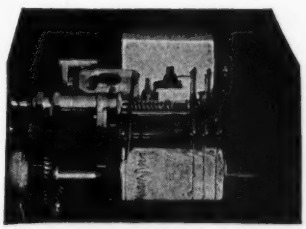
Fairmont M2 (standard series) Section Car being tested for fuel economy while carrying 8 men and tools. Data being automatically recorded by the Recording Dynamometer.

Reaching Ahead to Still Greater Economy!

On leading railroads Fairmont Railway Motor Cars are the standard of comparison in efficient, economical operation. And they are daily breaking their own records.

Despite this remarkable performance Fairmont Engineers are constantly striving for even greater economy. Elaborate tests that others might deem needless expense prove on track under actual working conditions the fitness of every new feature before adoption.

Railroads appreciate this service and the wider margin of comfort, safety and economy assured by Fairmont improvements as is evidenced by the fact that over 50% of all the cars manufactured each year are FAIRMONTS.



The Measuring Stick of Motor Car Values

The recording dynamometer gives in a few hours accurate data that heretofore years of careful observation could only approximate. It measures:

1. Maximum draw bar effort available for starting trailers.
2. Maximum draw bar pull at all speeds.
3. Maximum draw bar horse power at all speeds.
4. Economy (fuel consumption) at all loads and speeds.
5. Endurance. How long will a car sustain its maximum draw bar pull at a given speed? Let facts and figures decide your choice of Railway Motor Cars.

Performance on the Job Counts

FAIRMONT RAILWAY MOTORS, Inc.

Fairmont — Minnesota

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Fairmont

Ball-Bearing Motors and Railway Motor Cars

A Mouthful at Every Bite

BELOW the snow-capped peaks of India's Himalayas, the flesh-eating leopard roams freely in search of prey. The native fear of this ferocious "beast of shadows" is based on the gruesome knowledge of steely jaws that — like an Owen Bucket — snap a mouthful at every bite.

For Owen Buckets boast the distinction of getting a chuck-full load every time the closing line is overhauled. And the more loads a day — the more time and money you save. Owen Buckets possess nine different advantages that together contribute to a superior construction in bucket design which insures the greatest value to your digging dollars.

The Story of Owen Buckets — just what they will do for you — is told, and illustrated, in a folder which we call "2-A." A copy is yours for the asking.

THE OWEN BUCKET COMPANY
705 ROCKEFELLER BUILDING CLEVELAND, OHIO
New York, Pittsburgh, Philadelphia, Baltimore, Chicago, St. Louis, Miami, Los Angeles, Dallas, Portland, Minneapolis, San Francisco.

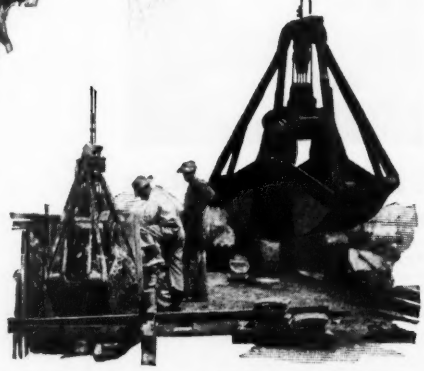
Guarantee

Owen Buckets, properly installed and operated, are guaranteed to do a bigger day's work than any other bucket of the same weight and capacity—

—or—

Write your own guarantee!

THE OWEN BUCKET CO.



Here is a ¾-yard type "D" Owen Bucket getting a full grab of clay every time it rises from the sewer trench. This bucket is one of three which are used for excavation work by the owners—The Haddad-Mall Company of Cleveland.

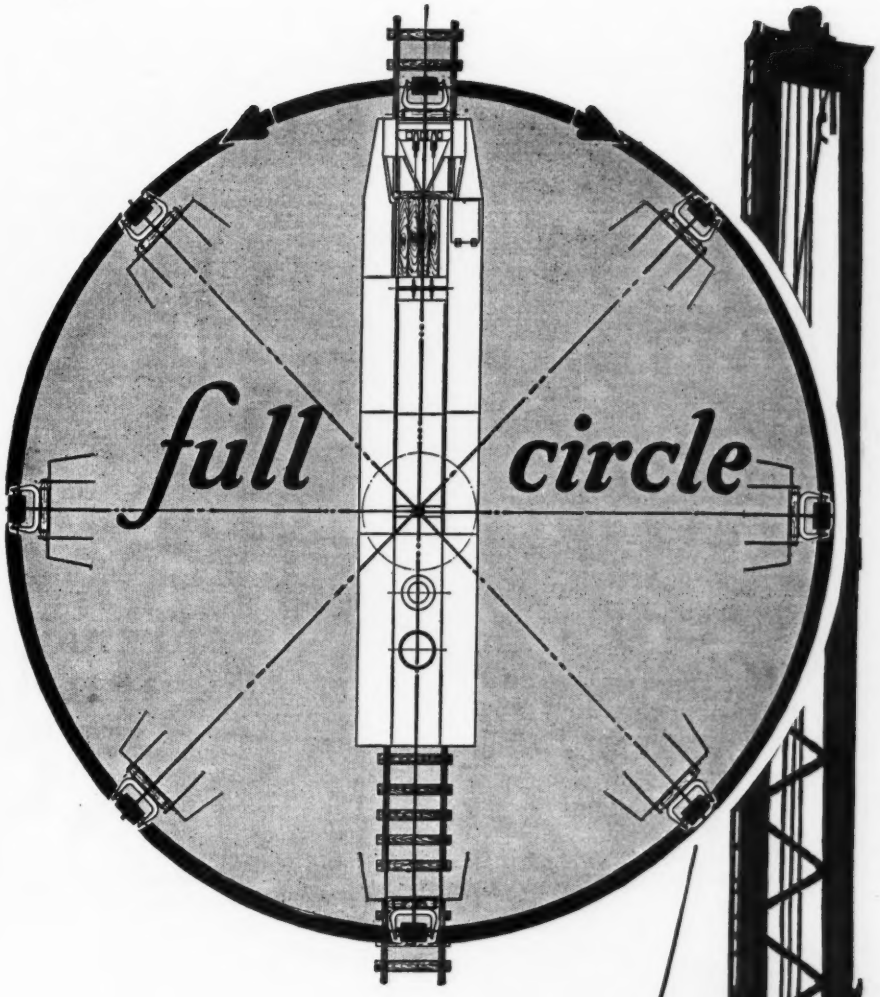
OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAY'S WORK

Owen Buckets

INSURE A BIGGER DAY'S WORK

© O.B.Co

No. 14 Pile Driver



Specifications

Engines—hoisting 10″ x 10″; travel and swing 10″ x 10″.

Boiler—horizontal 60″x12′3″, 194 2″ tubes, working pressure 175 lbs.

Trucks—capacity 150,000 lbs., journals 6″ x 11″.

Travel Speeds—fast 20 m. p. h., slow 7½ m. p. h.

Draw bar pull—slow speed 10,000 lbs., sluing speed 1 rev. per min.

Single line pull—pile 10,000 lbs., hammer 10,000 lbs.

Single line speed—pile 225 ft. per min., hammer 225 ft. per min.

Height of leads—42 ft.

Batter limits—2″ in 12″.

Weight—shipping, not including hammer 186,000 lbs., operating, not including hammer 206,000 lbs.

Brakes—complete locomotive type air brakes.

Driving piles 33′9″ from center of track with No. 14 Full Circle Pile Driver.

The McMyler-Interstate Company

New York-Philadelphia-Chicago
Pittsburgh-Buffalo-Detroit
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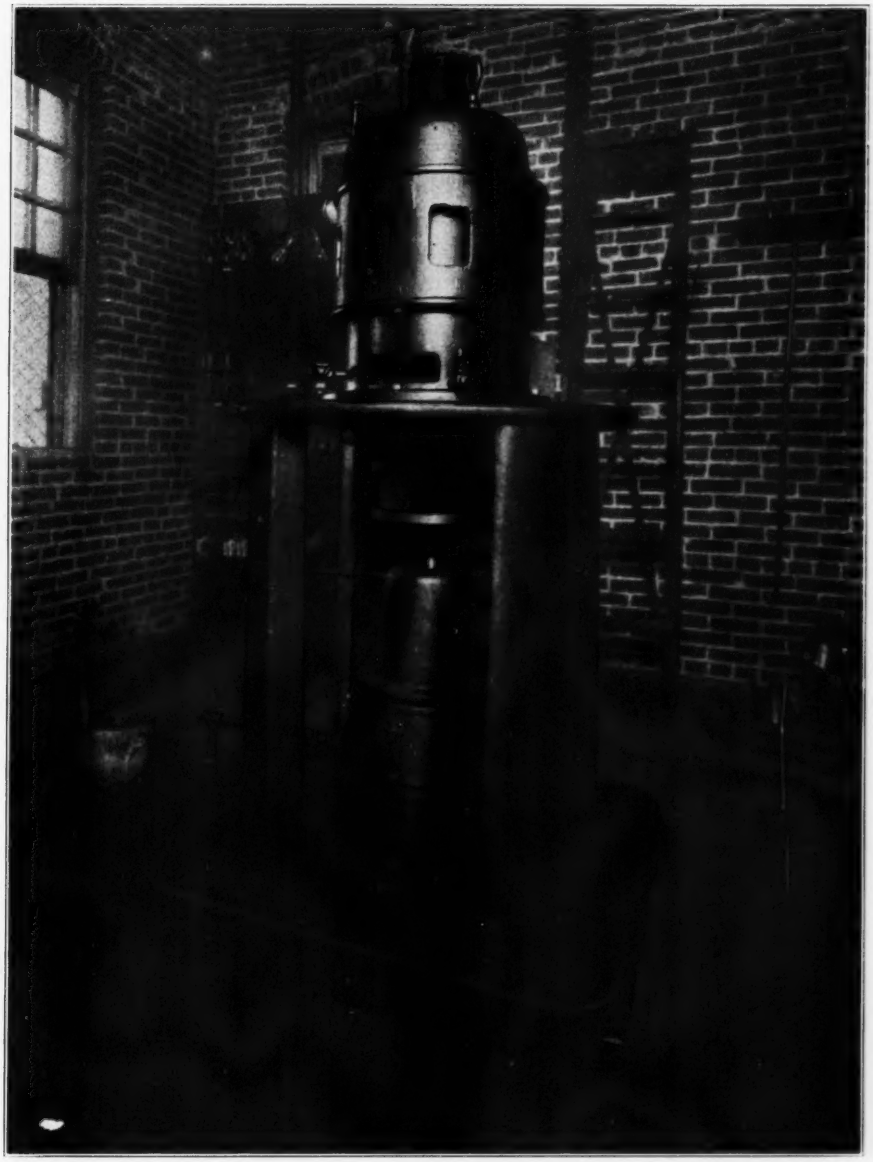
AMERICAN
AURORA, ILL.



THE "American" Deep Well Turbine illustrated above is designed to furnish 500 G. P. M. against a 110-foot total head, and is installed at the C. & E. I. Railroad, Jackson Yards, Clinton, Indiana.

This deep well turbine is used for serving the water tank at this station. This type of equipment lends itself readily to automatic and remote control, and consequently requires less attendance than is usual.

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THE AMERICAN WELL WORKS

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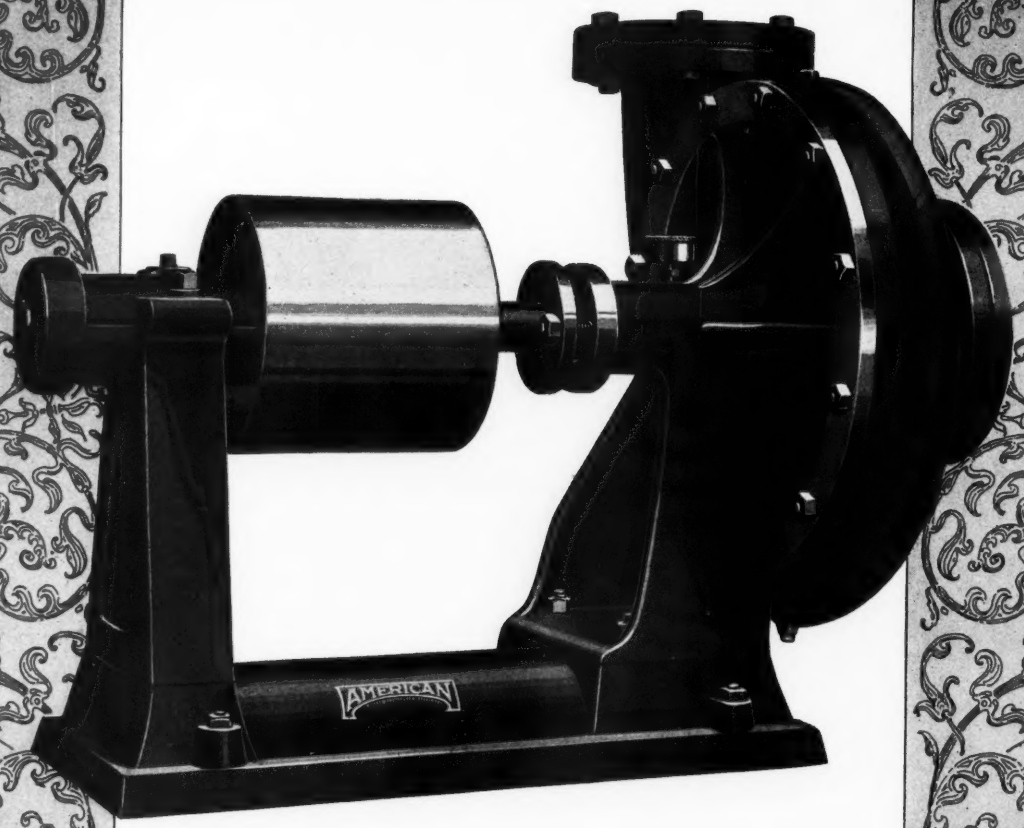
CHICAGO, ILL. ..... FIRST NATIONAL BANK BUILDING
DALLAS, TEXAS. ... WESTERN INDEMNITY BLDG.
SAN FRANCISCO, CALIF. .... 635 MISSION STREET



THE "American" type E pump is of the solid shell, side suction, open impeller, single stage type. Pump is furnished with open impeller, cast iron with cast iron gland and steel shaft or with bronze open impeller, bronze gland and monel metal shaft.

It is provided with ring oil bearing.

This pump is made in sizes from ¾" discharge to 15" discharge for total heads varying up to 125'.

Pump may be mounted on extended cast iron base provided with pin and bushing type flexible coupling for direct connection to electric motor.

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THE AMERICAN WELL WORKS

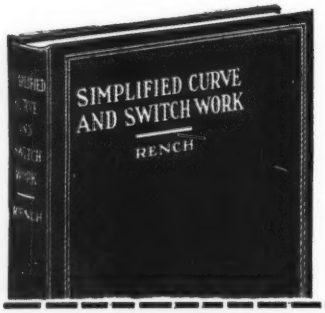
Relining a Curve With a String

MANY "pointers" on simplifying curve work which maintenance men can utilize to good advantage are contained in Simplified "Curve and Switch Work," by W. F. Rench.

Numbering among the many short cuts which Mr. Rench through experience and research has found to be of great help to the practical worker, are examples such as these: What Length of Switch is most suitable for use with a certain kind of frog; How you can solve the simpler problems of siding location with a tape line; The quickest way of figuring an economical bill of timber for a set of switch ties; How you can reline a curve with a string—accurately and easily.

Other topics that will help the worker to quickly settle knotty questions which arise from time to time, are covered in this manner: Preliminary Study of the Curve; The Solution of the String Lining Problems; Superelevation of Curves; The Spiral; The Vertical Curve; Economics of Curves; Essential Elements in the Design of Switch Connections; Rules for Computing Switch Dimensions; Rules for Various Function of Turnouts; Practical Considerations in Installing Turnout; Methods in Installing and Maintaining Switches; Simplified Field Work; Special Practices.

Remove the element of guessing from your work. "Simplified Curve and Switch Work" is just the book to help you do it. Examine it free—just mail the coupon.



206 pages, 23 diagrams, 4¾ x 6⅞, cloth, $2.00

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Simmons-Boardman Publishing Co.,
30 Church Street, New York City, N. Y.

Please send me a copy of "Simplified Curve and Switch Work" for five days free examination. I will either return the book or remit the price of $2.00 within the time limit.

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Simmons-Boardman Publishing Co.

Railwaymen's Book Shop

30 Church Street New York, N. Y.

Railway
Engineering and Maintenance

Volume 21 July, 1925 Number 7

A CHANGING LABOR SUPPLY

DURING the period from July, 1924, to April, 1925, 27,908 laborers were admitted into the United States while 44,750 departed, according to statistics compiled by the National Industrial Conference Board. In others words, there was a net loss of 17,000 laborers. During this period industry in general has been busy and at the same time there has been a growing surplus of labor.

This apparent paradox is due largely, if not solely, to the influx of Mexicans who have entered this country in greatly increasing numbers during the last two or three years, since the immigration ban does not apply to them. This influx is evident in any tour of the labor centers in the larger cities where the hobo and more recently the southern European have been replaced largely by the Mexican.

This transition will cause little concern to the roads for they were among the first to employ the Mexican and are familiar with his characteristics. They have found him a willing workman with modest desires and little given to roaming from one job to another. With the labor market such as that which now prevails, and with an adequate supply of good labor from which to select, railway officers in charge of divisions and of gangs have an opportunity to recruit desirable men into their forces. Having hired any group of men they should endeavor to so train and treat them that they will remain in the service and become efficient, permanent employees before the demand elsewhere becomes greater.

MONEY SPENT FOR DRAINAGE IS MONEY WELL SPENT

IT has long been recognized that water is the greatest enemy of track and that adequate drainage is essential to proper maintenance. Yet this fact is overlooked on many roads and drainage is neglected with the result that an undue amount of labor is expended for track maintenance or conversely that the proper character of track is not secured for the expenditure made.

A striking example of the results which it is possible to secure with relatively simple measures and moderate expense in the solution of particularly adverse problems is afforded by the description of the work done on the Atlanta & West Point, which appears in another column. As stated in that article, conditions which were so serious as to require the section force to work in one cut from one to four or five days a week, have been so greatly improved that the track has required no attention for eight months and special maintenance has been entirely eliminated.

While this is an unusual case, its equivalent will be found on many roads. There are short sections of track on many supervisors' territories which are temporized with from year to year with the result that no improvement is effected, while if sufficiently drastic remedial measures were taken the trouble would be cured once for all. That foreman or supervisor who does not feel that he has time to install the drainage which he knows is required is in reality wasting rather than saving time, for the labor spent in opening up ditches and, where necessary, in installing special drainage will save itself many times over because the difficulty will be cured once for all. Track forces have no more important work than to open their ditches and adopt such other measures as will insure the continual, free flow of water from the roadbed.

PUBLIC RELATIONS WORK OF A HIGH ORDER

A FOREMAN had been in charge of a section of track on a southwestern road for more than ten years. Adjoining the right-of-way was a ranch on which were several hundred head of blooded stock. Within the limits of the section was a reservoir which the railroad had built for its locomotive water supply.

This foreman had long made it a point to establish a friendly contact with the adjoining land owners. He extended them neighborly co-operation whenever opportunity offered. When their ponds became dry he cut the reservoir fences and allowed their stock access to the water in the reservoir and otherwise co-operated with them in the way that one neighbor is accustomed to help another in the west.

A short time ago the ponds on the ranch dried up and the cattle were without water. Before the foreman learned of this condition, the stock, prompted by their thirst, broke through a fence and wandered on to the right-of-way with the result that two head were killed by the train. The ranchman immediately filed a claim with the railway for the maximum amount which he could defend. When the claim agent came to investigate the claim, the foreman asked to be allowed to conduct the negotiations. Knowing of the man's long residence in the community the claim agent assented. The foreman then went to the ranchman, pointed out the years during which they had worked together as neighbors, reviewed the assistance which he had given the ranchman from time to time, including the use of the reservoir water for his stock, and stated that the killing of these cattle would be considered by his management as a reflection on the manner in which he had maintained his fence. When approached on this basis the ranchman readily recognized the merit of these arguments and as a result reduced his claim to the amount which he could have realized for the stock in the market. The settlement was made on this basis with everyone satisfied.

This outcome was made possible because the foreman had become a neighbor to the residents along the line and

through his service the railway itself was no longer regarded as an impersonal foreign corporation but rather as a real neighbor whose representative was the foreman. This is public relations work of the highest order, a development which maintenance men can foster more than has been done in the past.

SECURING MORE SERVICE FROM RAIL

THE railways are now giving more attention to the care of their rail than ever before. This is due in part to its higher cost per ton as compared with the prices prevailing prior to the war and also to the heavier sections now in use which add to the cost of rail per mile of track. A more important consideration, however, is the fact that the demand for relayer rail for branch lines has declined greatly on most systems during the last few years. As a result, a large proportion of the rail that is being installed in main tracks today is being left there until worn out. This requires that the rail shall receive more careful maintenance, for the riding surface of the track must not be impaired.

Out of these demands have grown a number of interesting practices . One of them is the renewal of the joint splices when the rail begins to batter. It is the common experience that as the rail ends begin to go down the joint deforms also. The replacement of the splices with new ones of standard contour does much to arrest battering of the joint and thus postpones the necessity for the renewal of the rail.

Another measure which has exerted a marked influence has been the construction of stronger joints, both in the design of the splices themselves and in the use of stronger bolts and spring washers or other devices to maintain a high tension in the bolts. By requiring the rails and the joint to act at all times as a unit the deterioration of any part is greatly reduced.

Another practice which has experienced wide application during the last few years has been the restoration of the original running surface of the rail head by the welding on it of additional metal by the oxy-acetylene process. By this measure a number of roads are now getting as much as three years additional life from rail in their main lines.

When the rail eventually has become battered at the ends to the extent that its continuance in track is no longer desirable, the prevaling practice is to remove it from the track, transport it to a central point, saw a short piece off each end, drill new bolt holes and return it to service. This rail is frequently being returned to tracks of the same character as those from which it was removed. The process is an expensive one because it normally involves its replacement with other rail when released and its transportation for considerable distances, in addition to the actual cost of sawing and drilling. A survey of the records on 24 roads, made by the Track committee of the American Railway Engineering Association last year, showed that the cost of transportation alone averaged $1.84 per ton or slightly more than the cost of the reclamation work. In an effort to eliminate this transportation cost several roads have tried to develop equipment to saw these rails in track and a number of experiments in this direction are now under way.

These measures reflect the fact that the roads are facing the necessity of developing ways to secure the maximum life from their rail in the tracks where laid first.

HIRING A ROADMASTER

A large emloyer of men is reported as having said that he never employs an office boy without first satisfying himself that that boy gives promise of developing into an executive. This practice might well be applied with equal effectiveness by the railways. Foremen are selected from the men in the gang; supervisors are selected from the foremen. So it goes all the way up the line to general manager, vice-president and president. The railway industry is officered to a greater extent than any other industry of similar magnitude by men who started at the bottom and rose by degrees to positions of great responsibility. In large measure therefore, the character of the management in the future will be measured by the potential ability of the men who are being selected for positions in the ranks today, for it is from these men that the leaders of the future will be drawn.

This thought deserves the serious consideration of all employing officers, whether of foremen or higher rank, because if they are impressed by the thought that when employing a man in their gangs they are selecting one who is entering training for a supervisory position, they will give this problem the consideration to which it is entitled.

KEEPING ABREAST OF DEVELOPMENTS IN BUILDING CONSTRUCTION

IN FEW LINES of construction has development been as rapid in recent years as in the field of building and nowhere has the manufacturer played a more important part or exerted a more profound influence. There was a time when building construction was a matter of established practice. The walls were either of timber or of brick or stone masonry. The frames, floors, and roof construction were of wood and the roof covering of slate, wooden shingles or tin. Doors were invariably of wood and the windows were plain glass set in wooden sash and frames. But time has wrought marked changes. Designers of the building frames may use wood in the form of mill construction, steel either exposed or incasing in fireproofing and concrete with any one of a variety of reinforcing systems.

But the most marked development is to be found in the wide variety of materials which must be applied to the naked frame in order to complete the structure ready for use. It affords the builder a wide selection of materials for floors, roofs, walls, doors, windows, and skylights, each with its peculiar adaptability to certain purposes. Further diversity has been introduced in the increasing complexity in the mechanical trades covering the heating, ventilating, lighting, plumbing, etc. Even in the case of chimneys a selection from several distinctly different types is afforded.

Many of these products are of long standing development but so many new ones are being introduced from time to time that it is only by maintaining an alert interest, by consistent study, that the man in charge of building construction can keep abreast of the times.

But is is not only the architect or the engineer of buildings who is concerned with these developments. The building maintenance officer occupies a position of no less importance in this connection. Very few of the specialized building products which are being promoted to the manufacturers cost less than the more common materials which they are designed to supplant. Therefore, in offering them for sale, the manufacturers are required to show that the materials which they offer serve the purpose better and will last longer than what has been used before. Therefore it is only by careful obser-

vation of the service rendered by various building products that the railroads can be afforded an adequate check of the claims made for materials which they purchase and apply in new buidings and thus be afforded reliable information on which to base decisions in future installations.

To fulfill the important responsibility imposed on the maintenance officer in this regard, he is not only required to have a thorough familiarity with current trade products, their advantages and limitations, but he must also know enough about them to note whether they have been properly applied and intelligently treated in service. Since he is also directly concerned with replacements he should be keenly alert to the possibilities of specifying products better suited to the purpose than those which have rendered unsatisfactory service. It should be clear, therefore, that the duties and responsibilities of the building supervisor and those of his superiors who are directly concerned with his problems are compelled to possess a much wider knowledge of buildings and building materials than was the case in the past and that it is only by a careful consideration of all information available to them on this subject that they can expect to keep abreast of the times.

A HEAVY RESPONSIBILITY

WE are now in the season of sudden storms in most parts of the country with their menace to railway tracks and structures. That this menace is a real one is evidenced by the accident at Hackettstown, N. J., a few days ago in which a passenger train on the Lackawanna struck a small mud slide, derailing the train and resulting in the death of 49 and the serious injury of a number of other persons.

Travel is constantly becoming more safe, owing to the greater permanence of construction and the increased care exercised in maintenance. On the other hand, the growing density of traffic increases the danger of a train encountering any defective condition before it is detected and remedied. This calls for continued alertness.

An accident such as that at Hackettstown serves to emphasize the oft-repeated statement that the responsibiliy of maintenance of way forces is never ending but continues throughout the night as well as the day. It is greatly to the credit of maintenance forces that travel has been brought to its present high level of safety. Yet an accident such as this shows that perfection has not yet been reached. While such accidents may be said to be due to "acts of God," they are, in most cases, due to the fact that some one took certain things for granted.

Every activity of life emphasizes the fact that it is not practicable to avoid all chances, but an accident such as this indicates that even with the most conscientious supervision conditions of an exceedingly grave nature may arise when they are least expected. Accidents are inevitable in industry and particularly in an industry of the character of railroading. They will occur at intervals with even the most adequate precautions. The problem is to reduce them to the minimum. This should be the objective of every maintenance employee.

TO GIVE SAFETY MEDALS—Mrs. E. H. Harriman has authorized the resumption of the E. H. Harriman memorial medal for the year ending December 31, 1924. The Harriman Gold Medal will be given to the railroad which has the best record for accident prevention and health promotion throughout the system as a whole. A silver medal will be awarded to the division of the road which has the best safety record.

Letters to the Editor

PROBLEMS OF THE BRANCH LINE

Ellenville, N. Y.

TO THE EDITOR:

Branch line track maintenance differs to a great extent on the various roads, although it has the common characteristic that the main line receives first consideration in nearly all cases on account of the heavy traffic which it carries at high speed. On main lines a large amount of track is surfaced out of face and rail laid each year. The main line supervisor, with large floating gangs and labor saving devices, is able to plan his program in the spring and see it carried out successfully before winter sets in. The only way to maintain track in good line and surface is to raise it out of face at intervals depending upon the ballast, drainage, etc.

Is it possible for the branch line supervisor, without any floating gangs or labor saving devices and with probably only a slight increase in the number of laborers in May or June when the season is well advanced, to carry out an extensive surfacing program? Will he be able to ride over his subdivision after the season's work has been finished with the satisfaction of having made some improvement in the riding condition of his track, besides renewing ties, mowing right-of-way, repairing fences so that the claims for killed stock may be kept to the minimum.

On account of the poor ballast which many branch lines have to use, it is necessary for the track to be surfaced oftener than main line track which has the better grades of ballast. It is, therefore, up to the branch line supervisor to raise as much track as possible each season, regardless of the conditions under which it is necessary for him to carry on his work. There is, however, a solution to this problem which will work quite successfully. That is to double up the section gangs, even though they are small, and let them work for a week on one section and then on another. If the track is given a two-inch raise over the high spots, the old ties can be pulled out and the new ones inserted with very little digging while at the same time straightening the old ties which may have been slewed due to rail creeping, etc. When the ties have been tamped and the track dressed and lined, two important things have been accomplished for the line and surface as well as the tie condition have been improved.

It works out satisfactorily to tie the track up well enough so that the ties will go two years without renewing. In an eight-hour day, 10 men will raise 12 30-ft. rails or 360 ft. of track and at the same time put in 30 to 39 ties. Forty ties a day is an average day's work for five men when the ties are dug out and spotted two or three to the rail. Therefore, by giving the track a little raise and pulling them out, one section gang has really surfaced 12 rail lengths, figuring that five men would be required to renew that many ties if they were dug out.

In three days eight men working eight hours a day surfaced 1125 ft. of track and inserted 90 ties, trucking the ties about a mile. This performance may seem a bit slow compared to a big operation, but in an entire season a gang of 8 to 12 men can surface quite a stretch of track and the labor saved from digging in the ties has been expended in improving the line and surface which will greatly improve the riding condition at the end of the season.

H. H. HANN.
Supervisor, New York, Ontario & Western

A Striking Demonstration of the Value of Drainage

Installation of Tile in a Cut on the Atlanta & West Point Removed Difficulty of Long Standing

AT THE TOP of a hill a half-mile east of the station at LaGrange, Ga., on the main line of Atlanta & West Point, is a cut that has given the maintenance of way department an untold amount of trouble ever since the road was constructed because of the constant presence of water in the roadbed. Before the advent of modern heavy power and equipment, it was possible to keep this track in condition only by raising it and placing additional ballast under it at frequent intervals. However, even these measures became ineffective with the increasing weight of power and of trains of late with the result that during the last five years it was almost impossible to maintain this track in a safe condition at reasonable expense.

Trouble developed at the most unexpected times. Track that was in good condition at night would be found to have settled and gone out of line to the point of endangering traffic by the next morning. It required constant watching, especially during periods of wet weather. The section gang made it a practice

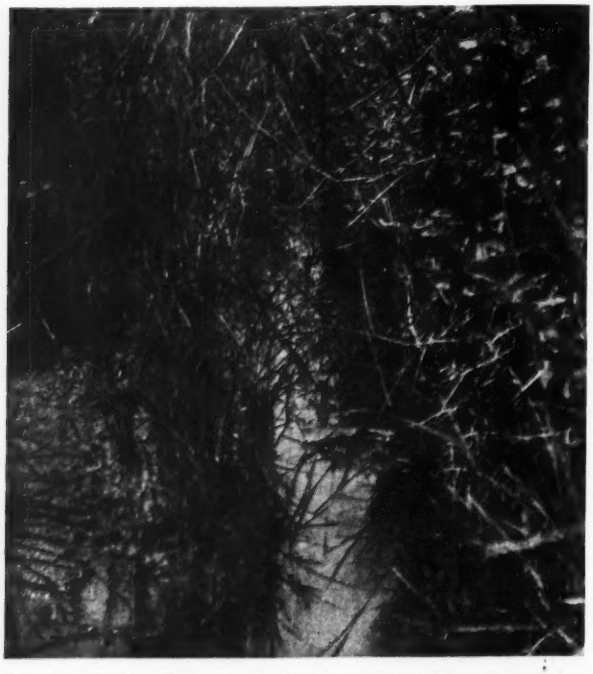


Fig. 1—Typical Wet and Swampy Conditions Prevailing Alongside the Track About Ten Feet From Rail Prior to Installation of Drainage

to work in this cut every Saturday regardless of how dry the weather was and in a rainy season they worked here as much as four and five days a week and even then could not keep the track in condition. Furthermore, the churning of the track was continually cutting the ties under the rails, necessitating the use of additional and heavier tie plates, the more frequent renewal of ties, etc.

The one condition which favored this track was the fact that trains moved over it at low speed since all of them stopped at LaGrange. Therefore, trains entering the town from the east were slowing up for the station stop and those leaving were ascending the grade and had not acquired high speed. In addition, all train men were familiar with the conditions at this cut and controlled their trains accordingly.

The traffic moving over this line is heavy for it is

Fig. 2—Photograph Taken at the Same Place as Fig. 1 Ten Days After Pipe Was Laid

the direct route for through trains running between New York and New Orleans over the Southern and the Louisville & Nashville. From 30 to 40 trains pass over the line every 24 hours, of which 12 are passenger trains, six being through trains with from 12 to 14 Pullman and day coaches. The decision to place a new de luxe extra-fare train—the Crescent Limited—in service between New York and New Orleans led to the decision to adopt measures to effect a permanent cure in this cut instead of continuing to provide temporary relief as had been done so many times before. It was, therefore, decided to install adequate drainage measures and work was undertaken in September, 1924.

Test holes were dug throughout the cut to ascertain the depth of the deepest water pockets and also the depth to which ballast had been driven by traffic. These ballast pockets were found to extend as much as five feet below the base of the rail, being deepest directly under the rails, a little higher in the center of the track and working to the surface in "heave lines" a few feet from the ends of the ties. In every case these pockets were found to be filled with water. In fact, water had to be baled from each test hole to permit the workmen to sink them to the required depth. In most places water was found within six inches of the bottom of the tie. After the holes were sunk to a depth of about six feet they were left open for an hour in which time seepage water would fill them level with the bottom of the ties. The entire

cut was found to be water soaked, water showing on the surface of the ground in many places.

It might seem from this condition that the cut was not properly ditched but this was not the case. Good open ditches dug to grade were located about ten feet from the rail and about three feet below the rail, carrying a considerable quantity of water. Yet water stood in the track 2½ ft. above the bottom of these ditches, unable to escape on account of the beaten strata of puddled moving clay in the "heave lines." This indicated that open ditches or side drains alone

Fig. 3—Installing Laterals at Intervals of Twenty Feet Through the Cut

could not cure a condition of this kind, but that it also required laterals under the track to tap these pockets and provide an outlet for the water.

Determining the Grades

When the deepest pocket was found, it determined the depth to which the pipe lines should be made. Levels were run and grade stakes set so that the bottom of the pipe when laid would be at least one foot below the bottom of the deepest pocket and the pipes were laid strictly to grade throughout the entire job. The fall was sufficient to permit the pipe to be laid on an average grade of 0.7 per cent, for although probably half of this grade would have been sufficient, it was considered advisable to take advantage of all of the fall possible.

Two lines of eight-inch bell and socket sewer pipe were laid for outlet lines, one on either side of and parallel with the track and approximately 11 ft. from the center. The trench was dug only wide enough to permit the men to work with ease, from 18 to 20 in. Owing to the nature of the soil and to its saturated condition, some caving of the main trenches was encountered and it was necessary to do some curbing. The trenching was begun at the outlet and progressed up-grade. As fast as it was excavated to its correct depth, a few joints of pipe were laid with the bell end up-stream and with open joints (that is, without calking or cementing on the original bed of clay). At the points where laterals were to be laid under the track, 8-in. by 6-in. tee joints were placed in the main pipe line and each marked with a stake. After the pipe had been laid clean engine cinders were placed in the trench and tamped around the sides of the pipe up to the spring line. Then more cinders were placed until the pipe was covered to a depth of six or eight inches. The remaining portion of the open trench was backfilled with the earth that had been excavated. These main pipe lines began to gather and carry away water immediately and within a week the surface of the ground alongside the track was completely dry.

Encounter Old Timber Wall

An indication of the measures which have been adopted in past years was found by conditions encountered near the middle of the cut. At this point posts or small piling were encountered which had been driven parallel with the track at intervals of about six feet for a distance of approximately 500 ft. On the inside of these posts, which were encountered at a depth of about three feet, two-inch plank had been nailed, forming a wall or fence. This fence had been pushed and twisted by the movement of the roadbed until it crossed and recrossed the line of trench and it was necessary to remove it to permit the pipe to be laid to grade.

Beginning at the same point and running the same distance, flooring was also encountered in the trench. For 250 ft. two-inch plank, longer than the ties, had been laid crosswise of the track and as tight as a bridge floor. For the next 250 ft. logs were encountered approximately 12 in. in diameter, hewn flat on

Fig. 4—One of the Main Pipe Outlets Showing the Amount of Water Flowing Out of Cut

two sides and laid parallel with the rails. From three to six of them crossed each lateral about four feet below the rail. On top of this flooring of plank and logs and between the plank fences were rock of all sizes from that of a man's fist up to that of a barrel. No one connected with the road today recalls when this material was placed so that it is estimated that it was put there shortly after the line was built. Not only was it necessary to remove this material to construct the trenches and laterals, but it also served to hold the water and made conditions worse.

As soon as the main or outlet lines were finished, the construction of the laterals was started at the lower end of the cut. These were placed at intervals of 20 ft. and staggered. Each lateral extended from a tee connection in the main pipe line at right angles to a point approximately under the second rail. The laterals were laid practically five feet below the base of the rail. The excavation for these laterals was extended some two feet beyond the end of the pipe, or out beyond the end of the ties. The pipes were laid with about three or four inches of fall to each lateral, care being taken to maintain a true grade. A clay

Fig. 5—A General View of the Cut Eight Months After the Drainage System Was Installed

disc, or stopper, was placed in the upper end of each lateral to prevent sediment from washing into the pipe. These lateral trenches were backfilled completely with clean engine cinders. The track was jacked up and the ties respaced and tamped, leaving the track slightly high at those points. The first train over settled it and in this way any unevenness in the surface of the track on account of these excavations was prevented. Two men worked on each lateral and these two men put in two laterals each day. It was not necessary to curb any lateral and no train was stopped or delayed. Running water was found in every lateral at a depth of two to four feet below the rail.

Heavy Discharge From Pipe Lines

The pipe lines were hardly in place until water began to pour from the outlets and the entire cut began to drain. It was estimated that the flow at the beginning exceeded 100 gal. of water per minute and in the eight months since the pipe lines have been completed water has flown continuously, even though the weather has been unusually dry during some of the intervening period. As an indication of the effectiveness of the drainage, a spring in an adjoining field approximately 200 ft. from the track, walled with concrete and with about 24 in. of running water in it, dried up completely within ten days, owing to its source evidently being tapped by one of the pipe lines.

In contrast with the time of the track force which was required prior to the installation of this system, the pipe laying was finished early in October of last year. By the middle of November the track was well settled and was given a final surfacing since which time it has received no attention with one exception when flood water did some damage. In spite of this fact the track is now in better condition than for years and more than 90 per cent of the maintenance has been saved.

In spite of the marked benefits which have been secured, this work was done at relatively small cost. It was handled with company forces which laid 3,206 ft. of pipe, including both mains and laterals, at a total cost of approximately $1,500. This included the labor of trenching, laying the pipe, backfilling, unloading cinders and cleaning up the cut after the work was finished, as well as the cost of the pipe and its freight, two small concrete headwalls at the outlets and the charge for engineering and supervision. The total number of hours of labor expended amounted to 1555 or equivalent to the time of 12 men working 13 days of 10 hours each.

This work was handled under the direction of O. T. Nelson, chief engineer, J. A. Johnson, roadmaster, and W. E. Pitts, supervisor, in accordance with plans submitted by representatives of the W. S. Dickey Clay Manufacturing Company, Kansas City, Mo.

Derail Fails to Stop Runaway Locomotive

INVESTIGATION of the head-end collision between a runaway switch engine and another switch engine on the Wabash at Oakwood, Mich., by the Bureau of Safety of the Interstate Commerce Commission, disclosed the fact that a defective derail was a contributing cause of the accident. The runaway engine had been left standing on a side track about 515 ft. from the switch leading into the main track and for some unaccountable reason while the crew left the engine unattended, it was set in motion, struck a derail located 165 ft. from the switch, knocked it off the rail, ran through the main line switch and continued on the main track until it collided with another engine about two miles distant.

The derail was of the sliding block type, pipe connected to the switch. The base plate spanned two ties and was secured to each by three track spikes. In the investigation the section foreman testified that he had examined the switch and derail on the morning of the accident and found them to be in good condition, but his examination on the morning after the accident showed that the switch stand had been pulled loose from the tie to which it had been spiked and that the tie was split for its entire length, and also that the derail was off the rail. He stated also that the ends of the derail were broken off, about three inches being missing from one end and about four inches from the other, but added that it had been in this condition for some time. His testimony also disclosed that the spike holes in the ties supporting the derail had become so badly worn that he was compelled to plug them on several previous occasions to make the spikes hold. He also expressed the opinion that although the ties supporting the derail were not in the best condition, the derail would have functioned properly under ordinary use and would have derailed a slowly moving engine, and that he thought the derail had been knocked off because the engine had hit it at a comparatively high rate of speed.

The conclusion of the Bureau of Safety is that the condition of the derail was one of the contributing causes of the accident, that owing to the poor condition of the ties upon which it was supported and the sharp blow it received because of the ends being broken off, the derail was knocked off the rail.

The Fixed Truss Before It Was Converted Into a Lift Span, the Old Draw Span Being to the Left

Delaware & Hudson Converts Fixed Truss Into Lift Span

An Old Bridge Across the Hudson River Is Remodeled Economically to Meet Government Requirements

By James McMartin
Chief Engineer, Delaware & Hudson, Albany, N. Y.

TO COMPLY with government requirements for a bridge over the Hudson river at Troy, N. Y., the Delaware & Hudson recently converted an existing fixed span into a lift span at about two-thirds the cost necessary for any other suitable arrangement. The structure upon which this work was done is a combined railroad, street car and highway bridge between Troy and the village of Green Island, N. Y., and on the line of the Rensselaer & Saratoga railroad, operated under lease by the Delaware & Hudson. The new lift span gives a clearance of 135 ft. above minimum low water and an unobstructed opening of slightly over 170 ft.

The original bridge was built in wood in 1852. There had been, previous to that, a bridge crossing the stream in this locality, which was finished in 1836 or 1838, and across which cars were drawn by horses, but engines hauling trains were not used until the reconstruction of this first bridge in 1852. The bridge was burned in 1862 and immediately rebuilt. In 1876 the three most westerly spans were rebuilt in iron, and in 1884 the five easterly spans were also rebuilt in iron. In this rebuilding the design was of three-truss, through lattice spans, carrying a double-track railroad and a highway, over which a trolley now operates, and called for four fixed spans, 184 ft. out to out of iron, and one rim-bearing swing span, 192 ft. out to out of iron. The distance center to center of railroad trusses was 26 ft., and the distance center of middle truss to center of highway truss 21 ft. 6 in. The swing span was so located that it gave a channel between the dock wall and the most westerly pier of only about 56 ft., the pivet pier being located on the land side of the river dock wall.

Since the opening of the barge canal in 1915, the river traffic using this channel has increased materially, both in the number of boats using the channel and in their size, and the situation was made worse by the government allowing the filling in of the most westerly fixed span, and part of the one next to it, by creating a new bulkhead line. This increased the current through the draw at times of high water, and made it more difficult for navigation. The result was that in 1922 the government ordered the building of a new channel span which would give not less than 150 ft. of unobstructed channel, specifying that there should be not less than 135 ft. of clear height above minimum water in the redesigning, if the design was to be a lift bridge.

The greater part of the river traffic passing through this bridge required an additional clearance above the lower chords of not more than ten feet at even the highest navigable stage of the river. It was therefore decided to place a lift span, rather than a swing span, as the latter would require the full opening of the span, even though the additional height required were only a foot or two, whereas the lift span would require only the actual additional height needed, and would be quicker of operation. The order of the government fixed the new channel, which was to be not less than 150 ft. in width, between piers 1 and 2. Negotiations were begun with Harrington, Howard & Ash, consulting engineers, Kansas City, Mo., to see whether it would not be possible to convert the span then in place into a lift span, as it was of sufficient strength to carry the heaviest power used by the railroad, and the condition of the metal was such that it was good for many more years of service. After final decision had been made that it was entirely practical to use the present fixed span as a lift span, detailed plans for the reconstruction were made, and the contracts were let, for both the substructure and the super-structure. The adopted design gave a structure consisting of three fixed spans, the converted lift span and a through girder span over the old channel opening. The old swing span was to be eliminated and an embankment built to carry the tracks between the old swing span abutment and the new abutment for the through girder span.

It would seem that wherever the ordinary lift required is not more than in this structure, that is, from 2 to 10

ft., the lift span should give better results than the swing span. As a matter of fact, since the bridge has been in operation, that is since April 1, it has not been necessary, with one exception, to raise it to exceed 10 ft. for the passing of any vessel, the exception being a dredge which it was desired to bring above the bridge to work in the river. This required some 25 ft. of raise. The occasions when it is necessary to raise the bridge to its full height, or give a clearance of 135 ft. above lowest low water, will be very infrequent. The government required 135 ft. clearance above minimum low water originally. It

The Back Legs of One Tower Was Carried on the Through Girder Span

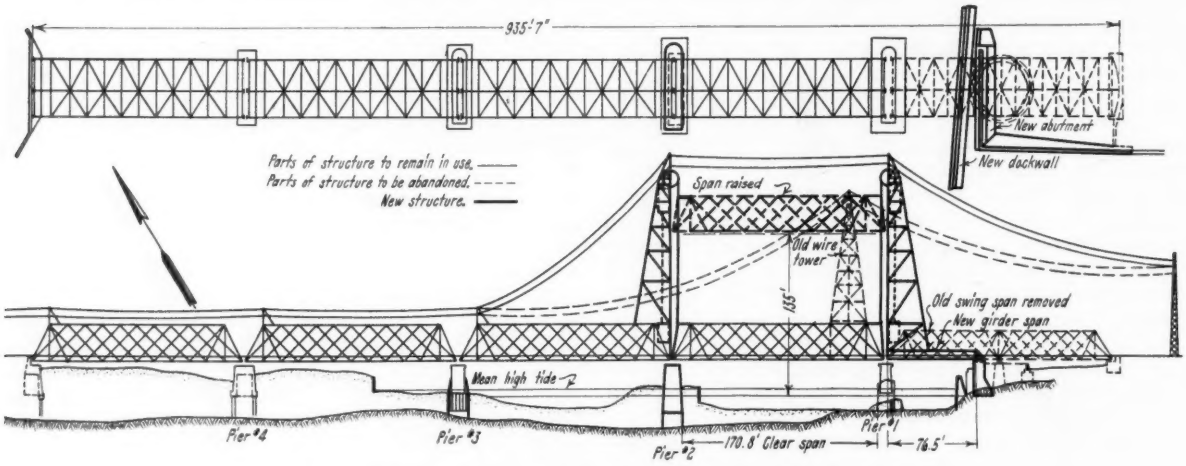
was afterwards stated that permission would be granted us to erect the towers so that they would give 108 ft. clearance if we would add the additional 27 ft. at the government's order. It was thought best to build the structure for the full lift at once, and this was done.

The government also required that there should be 14 ft. of channel depth below minimum low water and this necessitated changes in piers 1, 2 and 3. Pier 1 was founded on Hudson River shale at a depth of about 10 ft. below lowest low water and it was necessary to

A Close-up Showing the Lifting Columns, Tie-Back Struts and Channel Legs of One Tower

encase this pier in concrete to below the new channel depth. As pier 2 was founded on wooden cribs at practically low water, it was necessary to rebuild it entirely. In doing this it was found that the rock under this pier varied from a depth of 17 ft. below minimum low water on the south or down-stream end, to a depth of 48 ft. at the up-stream end. It was decided to drive a steel cofferdam around the entire pier and rest the reconstructed pier on rock, carrying the ends of the two spans on falsework during the tearing down of the old pier, the excavation and the rebuilding of the new pier. The government order further required that the 14-ft. channel should extend to the westerly edge of pier 3. As this pier was founded on piles cut off at low water, it was necessary to protect the foundations of this pier so that the channel could be so carried. This was done by encasing it in concrete in a way similar to that employed on pier 1.

The sub-structure work was let to the Great Lakes

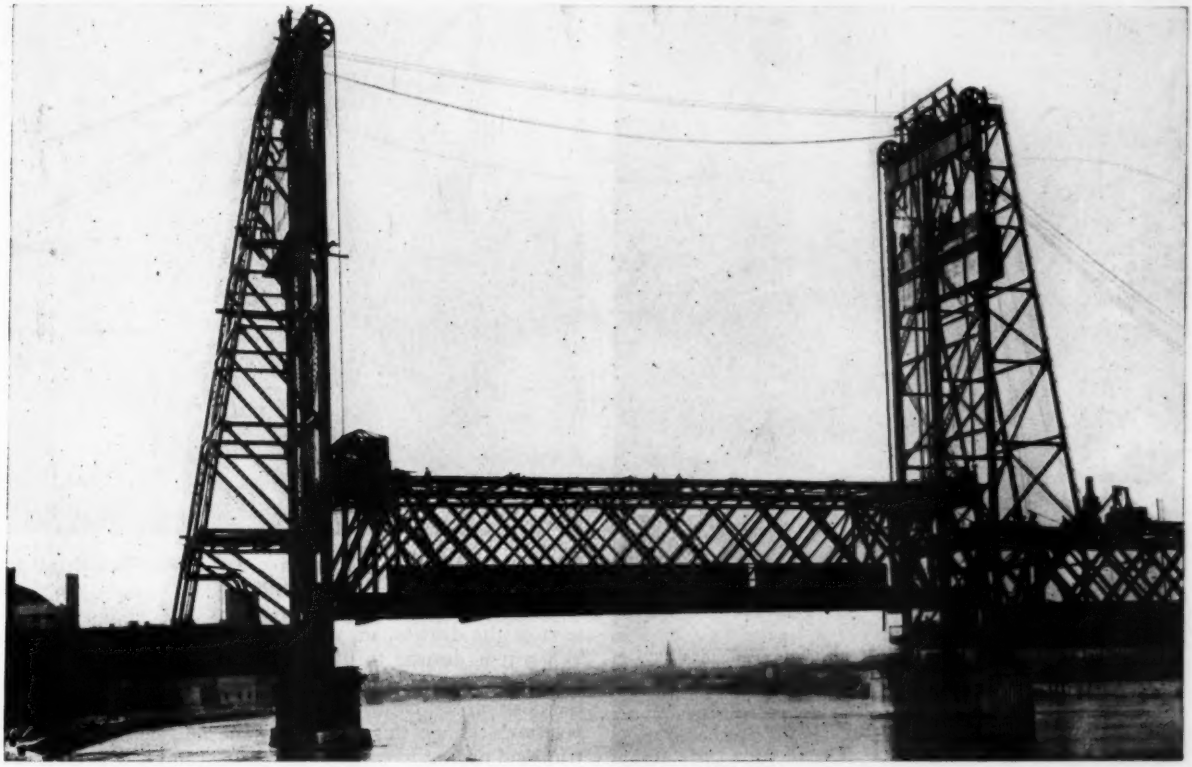


Drawing Showing Relation of the New Work to the Old Structure

Dredge & Dock Company, and was completed in June, 1924. The super-structure was let to the American Bridge Company, and this company began construction in the summer of 1924 by raising the entire structure 8 in., this also being a part of the government's order, although we could never understand what the need was for this 8-in. raise of the fixed structure except that it was desired to have a clear height under the bridge of not less than 30 ft. above minimum low water, the old bridge being 29 ft. 4 in. above that datum. This was followed by the erection of the westerly tower and by the changes necessary to convert the fixed span to a lift span. These latter changes consisted essentially of the addition of vertical lifting columns, riveted to special lifting plates which were in turn inserted in and riveted to the end posts of each truss. The lifting columns were surmounted by a lifting girder which was tied back to the upper chord of each truss by struts. The design was such that the lifting force was applied directly over the end bearings of the span. The channel legs of the towers were supported by special castings which were carried on the end bearing plates of the fixed span on the west end of the new through girder span on the east. The back legs of the towers were carried on the top chords of the fixed trusses and on the top of the through girders when they were placed.

Of course, navigation had to be carried on during reconstruction, and nothing could be done toward tearing down the old draw span, placing the through girder span between pier 1 and the new Troy abutment, and toward the construction of the tower on that girder span until the close of navigation in 1924. As navigation did not close until the middle of December, this was the rush part of the job and on account of its being carried on during the winter weather when there were many days that the men could not work on the tower, this part of the work was the most difficult. It was, however, carried on successfully and the bridge was opened for navigation on April 1, 1925.

Following the close of navigation the floor system of the old swing span over the draw was supported by falsework, the corresponding section of the old trusses being then burned away and removed. Up to this point all work had been carried on under traffic. The through girders were placed in position on a Sunday during which time the bridge was out of service for traffic for a period of about four hours. The new abutment intersected the ring wall of the old pivot pier and in order to eliminate possible extended delays it was decided to leave the ring wall in place and bring the abutment up to it on each side, bonding the concrete to it on the inside and outside. As a further aid to the solidity of the structure, a part of the section between the new dock wall and the pivot pier was filled with concrete. As a part of this work the section between the new abutment for the through girder span and the old inland abutment of the draw span was filled in and the remaining sections of the trusses were removed.



The Fixed Span After Conversion Into a Lift Bridge

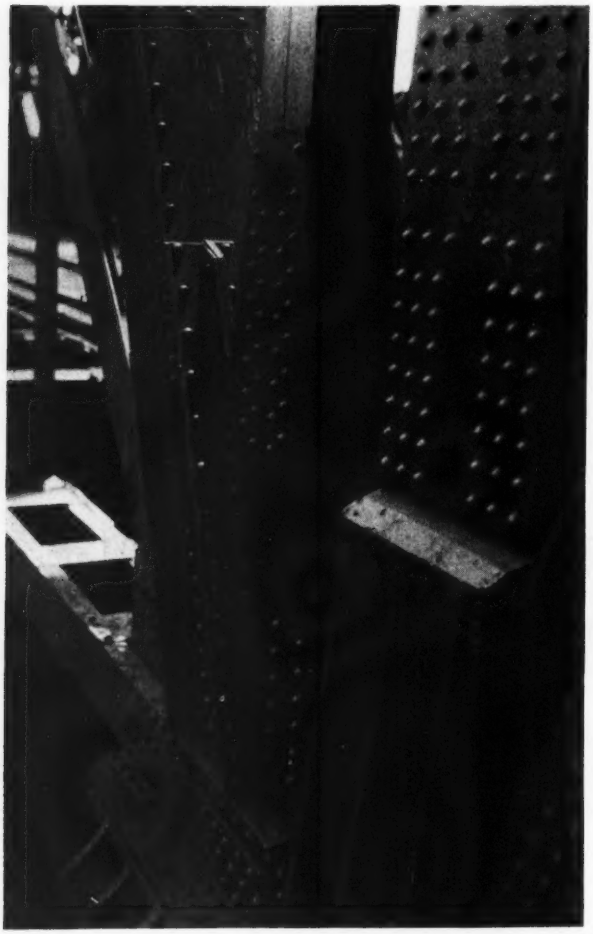
The new steel work consisted of the two towers, with the necessary lift girders, and the through girder span on the east side of the lift span, together with cables, machinery, counterweights, etc. The counterweights consist of approximately 681 tons of concrete blocks, or about 330 tons on the west end of the span, and 351 on the east end, the additional 21 tons being due to the operating house and additional machinery located on the east end of the lift span. These counterweights are carried by 32 cables on either end of the span, varying from 1½ in. to 1¾ in., according to their position. The cables at either end are carried over four sheaves at the top of the tower in groups of eight. After the counterweights were placed it was found that the bridge was

very nearly in balance, and it was only necessary to add a few additional blocks, space for which had been provided in the steel box designed for this purpose, placed on the top of the counterweights.

The operating power for the lift span is electricity with an auxiliary gas engine for use in case of interruption of current, the equipment consisting of two 85 hp. General Electric motors, and a 25 hp. Buda gas engine. The estimated travel of the bridge using the electric motors was from 48 to 50 ft. per min., and it was found on trial that this requirement had been met.

A total of 1,817,100 lb. of material was erected as follows: 852,400 lb. in the towers, lift girders, bracings, etc.; 387,800 lb. in the girder span; 286,600 lb. in machinery, sheaves, cables, etc., and 290,300 lb. in the material added to the existing span.

It was necessary to rearrange the interlocking signals protecting the draw span, and in doing this it was



The Lifting Columns Were Attached to the End Posts Directly Over the End Bearings—A Partial View of the Special Casting Carrying the Channel Leg of the Lifting Towers

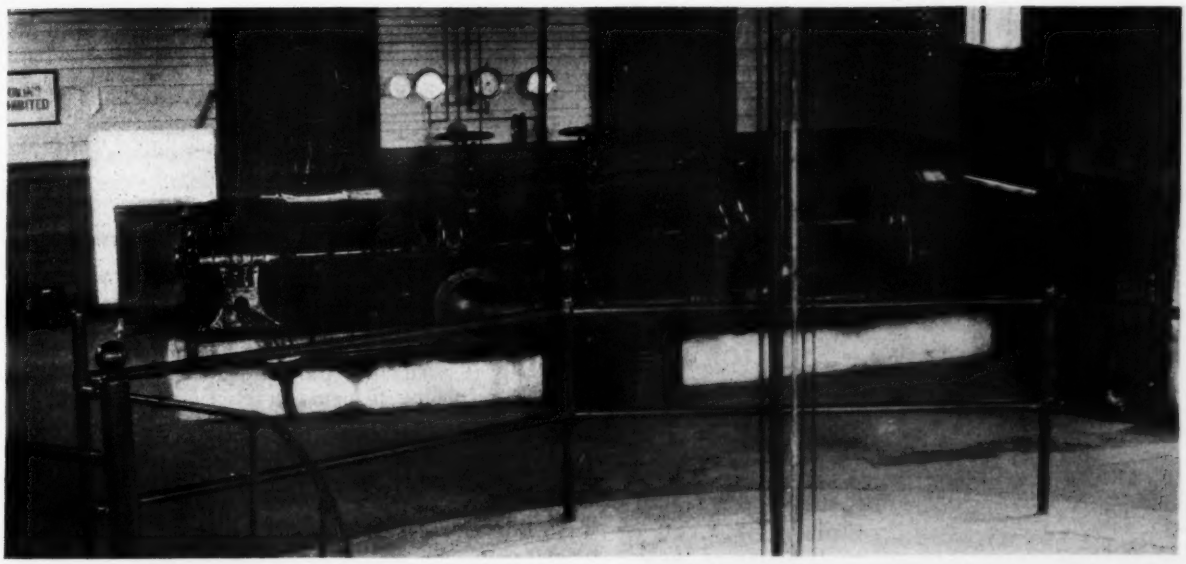
decided to install color light signals, with desk circuit controllers using storage battery floated on the power line for the operation of relays, chart lights and locks. The color light signals used 110 volt a. c. current, the circuit being arranged so that if a bulb burns out the electric lock controlling the bridge lock lever will not release. A three lever, style "D" interlocking machine is located in the tower on the lift span, two levers operating bolt locks and bridge circuit controllers, and one lever mechanically interlocked with the other two levers, requiring reversing before bolt locks can be removed on the draw span. Attached to this lever is an electric lock, which cannot be unlocked until all signals protecting the draw span are in the stop position. To provide for an emergency, a hand screw time release requiring two minutes' time, is provided in the tower and is connected so that all signals must be in the stop position before releasing the lock lever in the interlocking machine.

An illuminated chart, desk circuit controllers controlling the signals, and locks are located on the fixed span

One New Pier Was Constructed and Two Remodeled In Order to Conform

next to the draw span, with an attendant on the ground. When it is desired to lift the bridge, the operator in the tower notifies the attendant on the ground who operates the desk circuit controllers, putting all signals in the stop position. When this has been done he releases the electric lock on the lock lever in the operator's tower allowing him to unlock the bridge locks. When the bridge is lowered the bridge locks must be in place and levers normal in the tower and locked before the signals can indicate proceed.

BROKEN SWITCH CAUSES WRECK—Investigation of a derailment on the St. Louis-San Francisco near Kellyville, Okla., by the Bureau of Safety of the Interstate Commerce Commission, shows that the derailment was caused by a cocked switch resulting from the fact that the switch had been damaged during the passage of another train three hours previous to the accident. The earlier train contained one car loaded with pipe and one section of 12 in. pipe, becoming displaced from its position, projected over the side of the car far enough to strike and tear out the switch stand at a spur track, causing the switch points to come loose so that they were undoubtedly partly open.



Modern Equipment Was Used Throughout in This New C. & O. Plant

Huntington, W. Va., Water Facilities Have Interesting Features

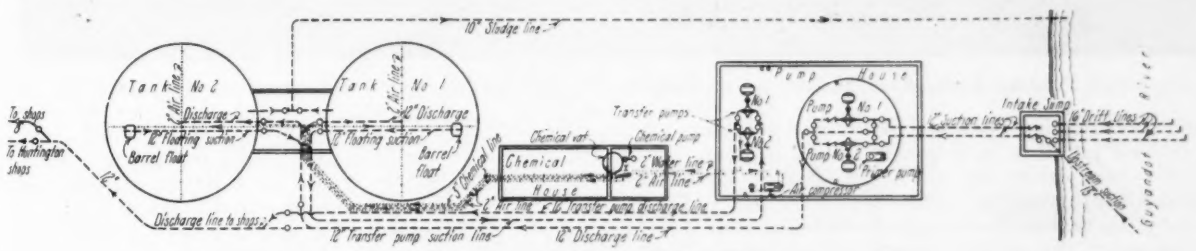
Chesapeake & Ohio Builds Intermittent Type Treating Plant Which Is Largest in Railway Service

THE CHESAPEAKE & Ohio has recently put into operation at Huntington, W. Va., an intermittent type of water softening plant that is probably the largest in railroad service. The two treating tanks at the plant are each 500,000 gal. capacity and in conjunction with the tanks at the shops give a storage capacity of about 1,300,000 gal. The old pumping equipment was completely remodeled, modern motor-driven centrifugal pumps being used throughout. The unit has a capacity of about 3,000,000 gal. a day and has already effected considerable savings in both locomotive maintenance and water supply costs.

Huntington is the headquarters for the western district of the Chesapeake & Ohio and the terminal point for a large number of feeder lines running into the coal fields of West Virginia. The railroad maintains shop facilities at this point which are the largest on the system. This results in a daily water requirement of from 1½ to 2 million gallons a day and in order to insure against a possible tie-up of the terminal due to a water shortage, necessitates a large storage capacity in addition to a large and reliable pumping capacity. The old facilities answered neither of these requirements. Further than that considerable trouble and expense were being incurred due to the condition of the water, which was affected by mine drainage, and also due to the condition and arrangement of the old equipment.

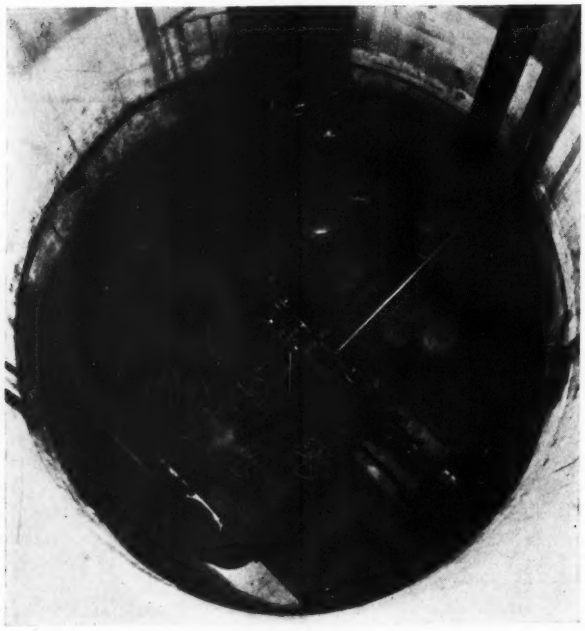
Water Is Affected By Mine Drainage

Two possible sources of water supply were available for the new plant, these being the Ohio and the Guyan rivers, of which the latter was selected owing to the fact that suitable intakes could be installed on company property about 1½ miles from the shops. Both sources had the disadvantage of a wide variation between high and low water, the maximum difference in elevation between the two stages being about 66 ft. As stated, the water was affected by mine drainage to a large extent and contained from 2½ to 15 grains of sulphates with traces of pure sulphuric acid at times. There was no appreciable amount of carbonates in it. The intermittent type of plant seemed the best type of water treating plant since the class of water at this location lent itself readily to this form of treatment



Pipe Layout at the Treating Plant

and also provided for the increased storage capacity which was badly needed at this terminal. This increased storage was supplied by two steel treating tanks, each 54 ft. in diameter and 30 ft. high on concrete foundations, and of 500,000 gal. capacity, and by changes at the shops to be mentioned later. The



The Arrangements of the Pumps in the Concrete Pit

treating plant was located at the pumping station rather than at the shops since the disposal of the sludge could thus be handled more easily. This was important as there were frequently large amounts of it.

The old pumping equipment consisted of two 14-in. by 16-in. triplex pumps located in the bottom of a concrete pit 20 ft. in diameter and 52 ft. deep. Each pump was driven by a 150 hp. electric motor and power head, mounted on the top of the pit, and operating the pumps by means of extension rods 3-in. in diameter. The severe demands of the terminal necessitated almost constant operation of this equipment, and because of this severe duty, resulted in high operating and maintenance costs.

Pumping Equipment Is Electrically Operated

This equipment was replaced by two horizontal, split case, double-suction, centrifugal pumps with enclosed type, cast-iron impellors, direct-connected to 75 hp. ball bearing motors. Each pump can supply water at the rate of 3,000 gal. per min. under normal conditions of the river. The piping and valve arrangement is such that either pump can pull from either of two suction lines, both delivering into one discharge line. The arrangement also permits the back washing of either suction line by either pump. Only one unit is used at a time, the other being held in reserve according to usual practice. A small duplex, electrically-driven plunger pump was installed for priming when necessary, and also to take care of pit drainage.

During high water stages, there was a considerable flow of sand in the river, a condition that necessitated extra precautions in the arrangement of the intake. A concrete sump, 10 ft. by 14 ft. by 15 ft. deep, was installed with three 16-in. wrought iron pipe drift lines leading out into the main channel of the river and with ends pointing down stream. The slow flow of water thus obtained permitted the sand to be carried on down-stream and resulted in a much clearer water in the sump. In addition to the sump, there were two suction intakes at higher levels which were used during the higher stages of the river to get away from the sand flow along the bottom. This general arrangement has worked very satisfactorily. The pit pumps deliver to the tanks or, if desired, direct to the shops, through a 12-in. line.

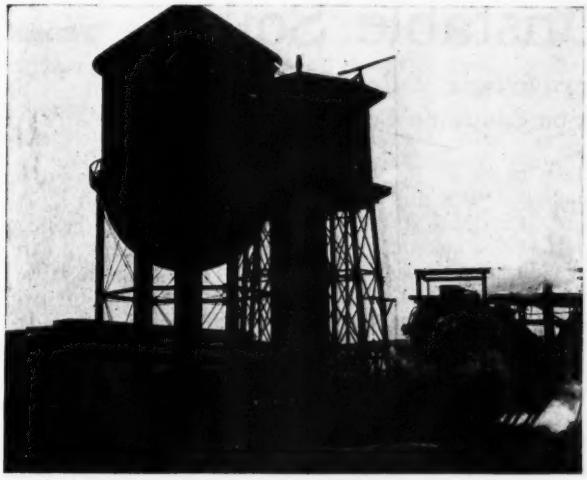
Treating Plant Is of Intermittent Type

The treating equipment, chemicals, etc., are situated in a 14-ft. by 42-ft. building located between the tanks and the pumping plant. The chemical equipment consists of a vat 6 ft. in diameter by 5 ft. high and a 1½-in. open-type impellor, centrifugal pump. Air agitation is furnished by means of a 100-cu. ft. per min. electrically-driven air compressor situated in the pump house. A lime and soda ash treatment is used for neutralizing the acid and removing the scale-forming

Two Large Treating Tanks Each of 500,000 Gal. Capacity Obviated the Necessity of a Reservoir at Huntington, W. Va.

solids, and as the mud conditions are severe, sodium aluminate is added to hasten the settlement. These chemicals are added as each tank is filled, following which the solution is air agitated for 30 min. After 30 min. more, the water is ready for use. One tank is treated as the other is used.

The water is drawn from the tanks through a floating outlet pipe with the intake 36 in. below the surface. For the purpose of drawing the water from the treating tanks and delivering it to the tanks at the shops, a double pumping unit was installed in the pump house. This consists of two centrifugal pumps of the horizontal, split case, suction, cast-iron, enclosed impellor type direct-connected to 75 hp. ball bearing motors. Both units discharge into the 12-in. line to the storage tanks at the shop, being started and stopped by an automatic float control, regulated by a 3-ft. variation in head at the shop storage tanks. Only one unit is used at a time. The capacity of each pump is 2,500 gal. per minute. The total plant capac-



The Storage Facilities at the Shops Were Increased by a New 200,000 Gal. Tank

ity is approximately 3,000,000 gal. per day. The tanks are cleaned of sludge every three weeks, being emptied through a 10-in. line into the river. The plant will remove approximately 600,000 lb. of scaling matter from the water per year in addition to a large amount of sand and suspended matter.

The former water storage facilities at Huntington consisted of one 100,000-gal. wood tub on a 45-ft. steel frame and a 50,000-gal. tank on a 30-ft. steel frame. As the latter unit was in poor condition, it was replaced with a 200,000-gal. hemispherical, elevated type, steel tank, the top of which was level with that of the 100,000-gal. wooden one. These two tanks in conjunction with the two at the treating plant gave a storage capacity of 1,300,000 gal.

Treatment Has Proved Beneficial

The results of the treatment and the improved facilities began to show up within a short time, being noticed first in the boilers at the shops. It was formerly customary to turbine the tubes in each of five water tube boilers every six weeks and at this time a hard, tenacious scale would usually be found that varied from ⅛ in. to ¼ in. in thickness. Since the treating plant has been in operation the accumulation of scale has been practically negligible and it is estimated that the tubes can now go at least a year between turbinings. Other savings have been made, among which are the cost of operating the pumping and treating plants. Where it was formerly necessary to use 3,600 hp. hrs. per day, the new plant necessitates only 2,400 hp. hrs. per day as a combined maximum while maintenance charges were very materially reduced.

The new facilities were designed by R. C. Bardwell, superintendent, water supply of the Chesapeake & Ohio, under the supervision of L. B. Allen, superintendent maintenance of way. The construction was carried forward under the direction of G. B. Wall, vice president, and C. W. Johns, chief engineer. This work is a part of a general program of water service improvements for the Chesapeake & Ohio, inaugurated by W. J. Harahan, president.

Another Rail Laying Record

A TOTAL of 426 39-ft. rails of 100 R. B. section or 16,614 lin. ft. were unloaded and laid in track by 61 men on the Chicago division of the Baltimore & Ohio on February 20. This rail was unloaded and laid at the rate of one rail every 28½ seconds or at the rate of 272.4 lin. ft. per man.

This record was made without any advance preparation other than to distribute the necessary angle bars, bolts, spring washers, spikes and anti-creepers. Finding that he had 4½ cars of rail under load, John Clark, supervisor at Walkerton, Ind., hurriedly assembled several section gangs and supplied them with a work train and rail loader. At 7:42 a. m. the men started work on the south rail of the westbound track. The work train with the rail loader and the car of rails were on the westbound track. By means of the rail loader the rails were transferred directly from the car into position in the track via the rail loader. After stopping at 10:50 a. m. for an hour for lunch, the north rail was relaid in the same manner. The track was closed at 3:55 p. m. and at 4:15 p. m. the entire 426 rails were full-bolted and full-spiked and anti-creepers applied and the men boarded a train at 4:34 for their homes. This rail was laid in automatic signal territory and was all drilled and bond wires applied by the signal maintainers by 4:40 p. m. The detailed record of this performance is indicated below:

8:03 a. m. to 8:45 a. m. (42 min.)—89 rail unloaded and set in track.

8:55 a. m. to 9:30 a. m. (35 min.)—67 rail unloaded and set in track.

9:55 a. m. to 10:25 a. m. (30 min.)—54 rail unloaded and set in track.

12:00 noon to 12:15 p. m. (15 min.)—31 rail unloaded and set in track.

12:24 p. m. to 12:32 p. m. (8 min.)—15 rail unloaded and set in track.

12:59 p. m. to 1:22 p. m. (23 min.)—54 rail unloaded and set in track.

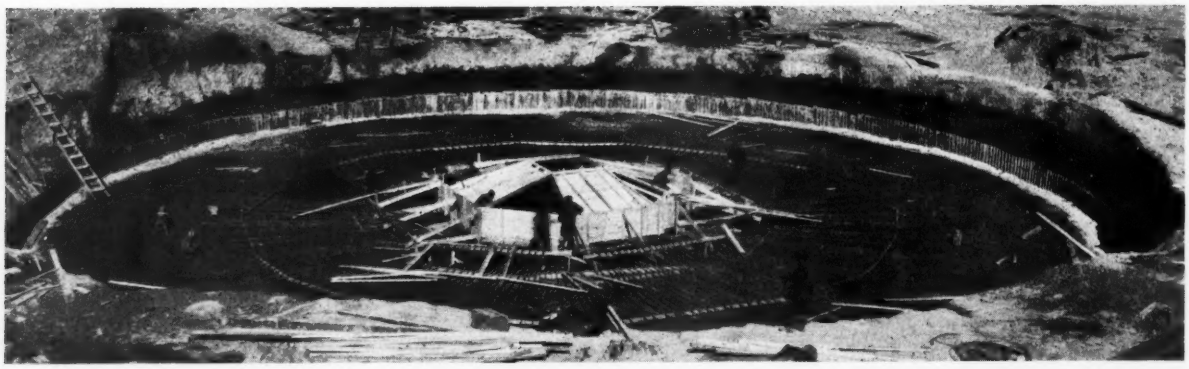
1:47 p. m. to 2:09 p. m. (22 min.)—52 rail unloaded and set in track.

2:45 p. m. to 3:00 p. m. (15 min.)—36 rail unloaded and set in track.

3:30 p. m. to 3:43 p. m. (13 min.)—23 rail unloaded and set in track.

Total, 203 min.—426 rail unloaded and set in track.

"Hump" Yard Operation in Arabia



The Turntable Pits Were Entirely Enclosed with Steel Sheet Piling

Some Interesting Foundation Problems Result From Unstable Soils

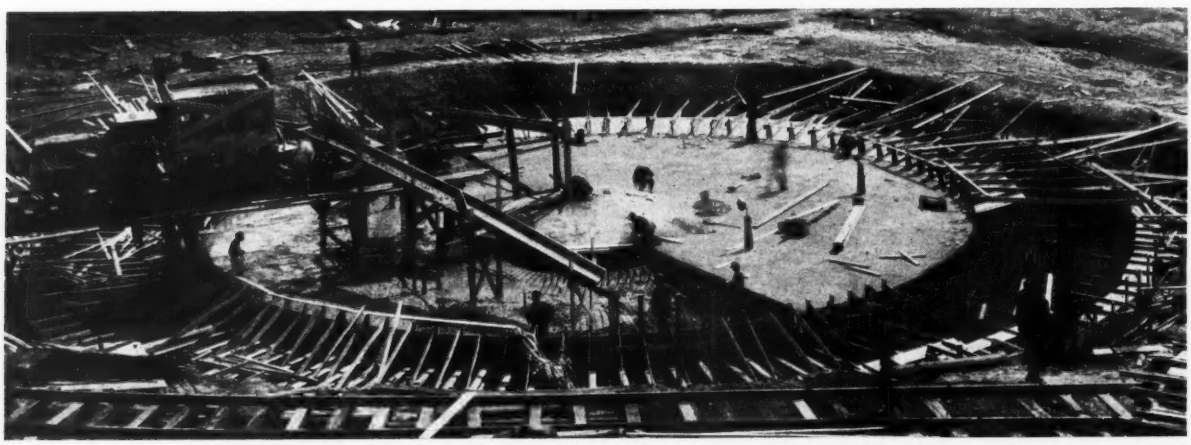
New York Central Utilizes Interesting Designs of Concrete Mattresses in Connection with Work on Castleton Cut-off

OWING TO the instability of a particular type of blue clay which was quite prevalent in the grading work attendant to the construction of the Castleton cut-off and the Selkirk engine terminal near Albany, N. Y., the New York Central had to meet two rather difficult foundation problems. One of these involved the foundations for two turntables and the other, a large three-barreled box culvert under a heavy fill. In both cases, concrete mattresses of a design different from each other and from those usually used, were resorted to, in order to secure stable structures.

In building the cut-off and its accompanying facilities, most of the excavation was of clay of one kind or another and of these a blue clay was encountered which gave trouble wherever it was found. This type of clay was, in reality, a pulverized slate and shale and contained a large amount of water, thus making it very unstable. In fact, the material was so unstable that when wasting it the clay had to be confined or it would run all over the country. Even when left undisturbed, it furnished a very insecure foundation.

One of the connections leading to the Selkirk yard crosses a stream known as Coeyman's creek, on a fill about 75 ft. high, the creek being subject to heavy overflows in the spring. The soil at the point of crossing is underlaid with this blue clay to a depth of about 70 ft. with occasional strata of sand from two to three feet thick. The amount of flow which had to be taken care of indicated an opening equivalent to a 50-ft. arch. However the loadings for a span of this size or even for two spans of equivalent size were prohibitive and it was decided to erect a structure which would permit of safe loadings and likewise be of such a construction that possible failures due to settlement, shifting, etc., would be obviated. The type of structure which was selected consisted of a three-barreled, reinforced concrete, box culvert with over-all dimensions of 224 ft. by 71 ft. and openings 15 ft. wide by 22 ft. 6 in. high.

Owing to the instability of the soil, the site of the culvert was entirely enclosed with interlocking steel sheet piling in the form of a rectangle 70 ft. wide by 230 ft. long. The soil was then excavated to a depth well below the bottom of the finished culvert, following which piling was driven on 3-ft. centers in each direction except at the ends of the culvert where it was placed only under the haunches and retaining walls. The piling was then cut to grade and the space between them and out to the sheet piling was filled with cinders and well tamped up to



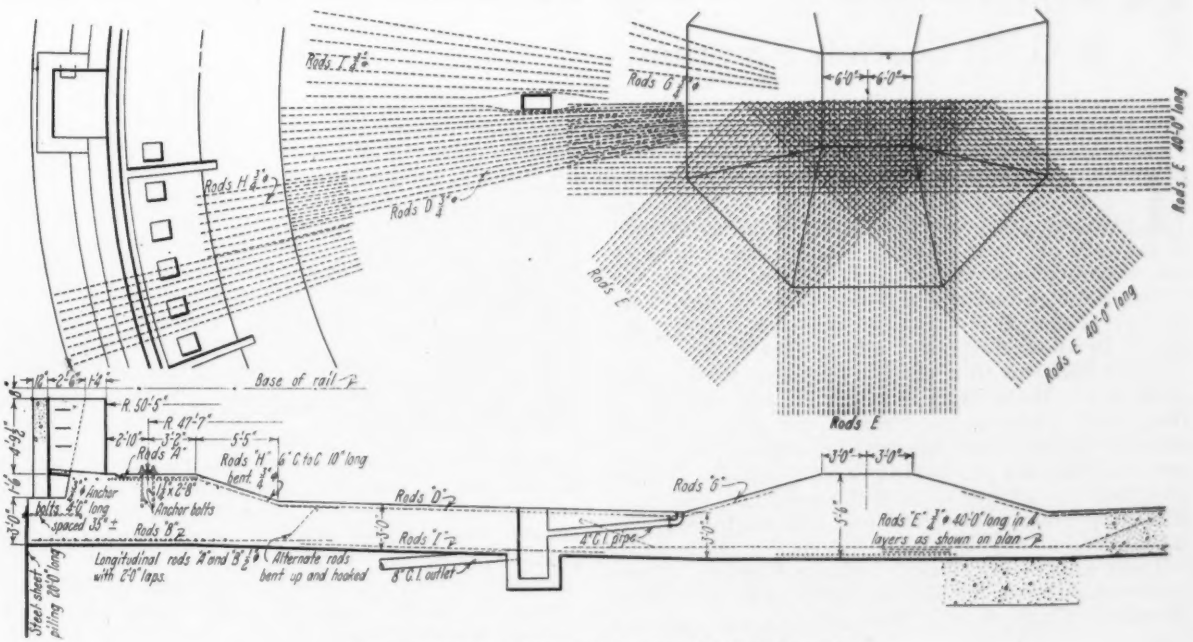
Some 300 Ft. of Unstable Blue Clay Necessitated the Use of an Unusual Design of Concrete Mattress

The Soil Under Coeyman's Creek Culvert Was a Very Unstable Blue Clay

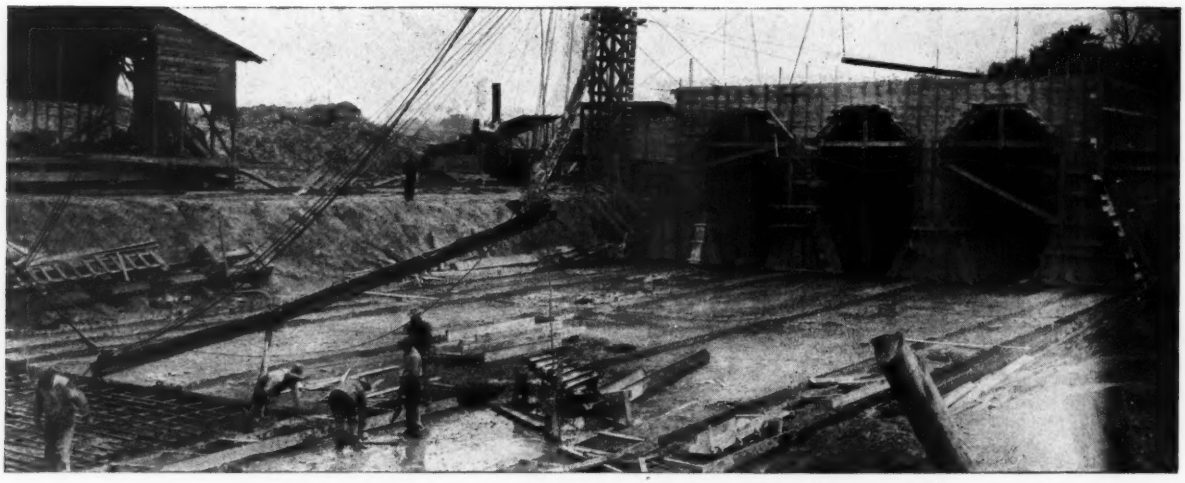
within 3 in. of the top of the piles. Reinforcing bars were then placed and a concrete slab 3 ft. 9 in. thick poured, followed by the side walls and top slabs of the culvert. The culvert was built in sections 35 ft. long, to provide some flexibility to the structure. The sheet piling was left in place to form a retaining wall against possible disturbing soil actions by providing a plane of cleavage between the surrounding soil and that under the concrete mattress. Since the cudvert has been built, there has been a settlement of about two inches at the center and nothing at the ends as contrasted to a setlement of the surrounding soil of from 10 to 15 ft.

The other unusual foundation was in connection with the turntable pits at the Selkirk engine terminal. There are two engine houses at this point, each served with 100-ft. tables of the continuous type with three-point support. The ground underlying the turntable sites was of soft blue clay to a depth of about 300 ft. Test piles which were driven in this soil and loaded to six tons, all settled and the settlement, although slow, was continuous for about a week following which they were pulled, the possible use of piling discarded and a form of reinforced concrete mattresses adopted instead. The preparatory work for this construction was somewhat similar to that for the Coeyman's Creek work in that the area of the turntable pit was excavated to a depth of 3 ft. below the bottom of the masonry after which 20-ft. steel sheet piling was driven around the foundation at the outer edge of the rim. The space inside the piling was then filled with cinders, placed in three 12-in. layers and well rolled with a caterpillar tractor.

A concrete mattress which in reality consisted of three differently designed sections was then poured upon this base. The center and the rim of the mattress were designed for a loading of one ton per square foot, the center being an octagon, 24 ft. in diameter and with a maximum thickness of 5 ft. 6 in. The rim was 16 ft. wide with a maximum thickness of 4 ft. 6 in. and was reinforced so that the load was distributed over a length of 20 ft. The space between the rim and the center was filled with concrete, 3 ft. thick, and reinforced against uplift in case the center and rim tended to settle down



The Turntable Mattress Was Heavily Reinforced



Placing the Concrete Mattress for Coeyman's Creek Culvert

and force the clay up between them. Reinforcement was also provided to prevent the center and rim from settling under any one position of the turntable and its load and the segments of the rim on each side raising. In working out this foundation problem, there was no precedent to determine what the upward force would be on the unloaded portions of the foundations. The design, however, provided against an upward force of 300 lb. per sq. ft. in excess of the weight of the concrete for the space between the center and the rim and an upward force of 100 lb. per sq. ft. in excess of the weight of the concrete on the segments. These turntables have been in use for a period of about six months and to date there has been no settlement or cracking of the concrete.

This work formed a part of the Castleton cut-off project of the New York Central and was carried forward under the direction of the engineering department of that road, G. W. Kittredge, chief engineer, through a field organization, working under the immediate direction of W. F. Jordan, principal assistant engineer.

The Requirements of A Good Section Foreman*

By W. C. Bamm
Section Foreman, Detroit, Toledo & Ironton, Dundee, Mich.

TO ME THERE ARE but two kinds of section men—those who love their work and those who do not. If a foreman finds that he has a man in his gang to whom the day seems a week long, or one who begins to look at his watch every ten or fifteen minutes in the afternoon, there is something wrong. The man is either out of place or lazy. He should be allowed to find a job he likes.

Don't hang on to a careless man, no matter how good he is. He is likely to injure himself and others. Don't keep a lazy man and make your good men help earn his wages. The management does not like such men and they get you behind on your section. I have been forced to change three of my men. One was careless. The other two were young and single, but they were tired.

There are also two kinds of section foremen. There is the one who really likes his work, who looks after the right-of-way as if it were his own and does not need to be told where to go and what to do. The other kind may have the experience, but he lacks the ability to keep things going. He has to wait until the roadmaster comes along and tells him to give the switches a coat of paint, or pick up his scrap from the past year, or straighten up a cross sign.

Section laborers, I believe, are at their best between the ages of 30 and 40. Of course, young men are favored, and they often, I must admit, make good workers if they are married. But they are generally too young for foremen. There is no man living that will make a good section foreman, handle a gang of men and do constructive work, unless he has had years of experience. It so often happens that the young man will not learn, because he knows already.

Following the winter months, experience has convinced me that this is a good general work program to go by: First give the section a general lining and spotting up, then run in all necessary ties as soon as possible. By this time of the year, a section foreman, under good track conditions, should have all spikes driven, bolts tightened and right-of-way burnt over the entire section. Arrangements should be made to have all ties in main track by the last of June. Then one has a month or so for scuffing and mowing. After that the track should have a good surfacing and all new ties should have their second tamping before winter. Surfacing should all be done by the middle of October. Track should also have a good lining before snow falls. Under this program there are then four to six weeks left to do odd jobs, such as ditching, building fence and doing a little spotting up. Care should be taken not to let the men dig the bed too deep for new ties. It is better to take a jack and raise track one inch and have a tie solid, than to have several inches of loose ballast under the tie. This neglect causes many kinked rails and a lot of extra spotting up a month or so later.

A few good words, to take or leave. This, and the next few months, is the time when men let go and say to themselves: "What's the use?" It is also a season of opportunity to those who can conquer themselves. There is a sunshine of prosperity that can be gained only by hard work.

Unfortunately, no one can make this decision for others. Each must make his own. Those who think they are working because they go through the motions only fool themselves.

*From the Detroit, Toledo & Ironton Railway News of May 15.

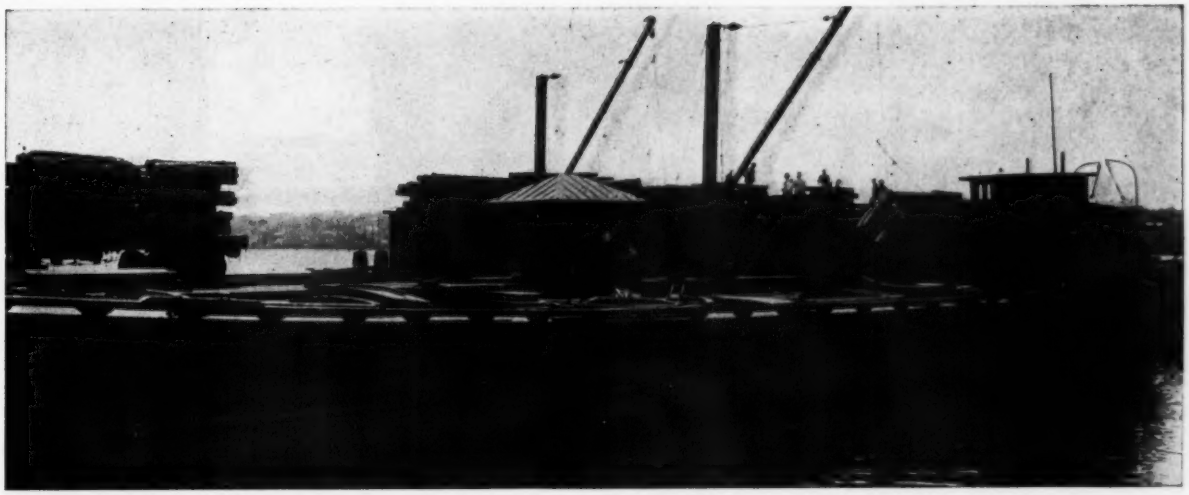


Fig. 1. The Fifth Car Off of Every Barge Is Subjected to Technical Inspection

Promoting Uniform Grading of Ties

Technical Re-Grading of Sample Lots Secures Excellent Results on Reading and Central of New Jersey

IN ORDER to bring about a more uniform grading of ties by field inspectors of the Reading and the Central of New Jersey, an interesting plan of checking their work has been put in service at the Port Reading creosoting plant of the above roads. This method includes a technical re-grading of a small part of each incoming shipment under conditions that permit of careful and accurate inspection. Through this plan the general tie inspector can keep close track of the grades and quality of tie timber accepted by each field man and purchased by the two roads, and is thus enabled to eliminate much of the variation of inspection and grading which

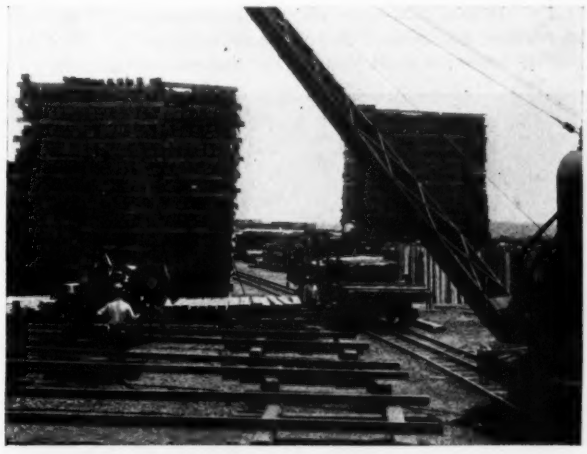


Fig. 2. The Racks Consist of 33-ft. Rails Supported on Cribbing and Spiked to Gage

usually result from various men working in different sections of the country. As a result of this check system the shipper or tie producer is insured of a more uniform inspection at all times, regardless of the inspector who may be doing the work, and is thus in a position to know at all times where he stands in relation to the requirements of the railroad.

A substantial proportion of the ties for the Reading and the Central of New Jersey are Southern hardwoods and include white oak, red oak, pine and gum. These

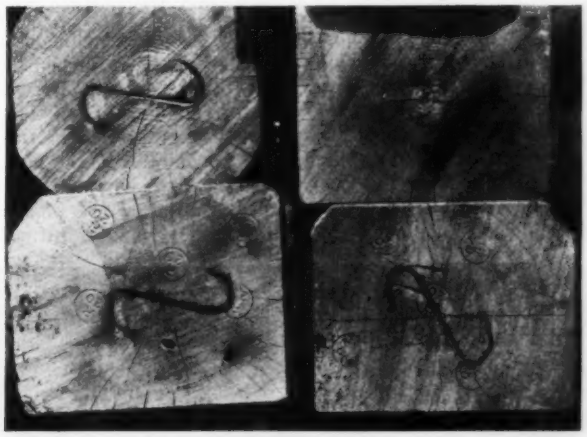


Fig. 3. The Grading Is Indicated by Hammer Marks on the Ends of the Ties

ties are transported to tidewater and shipped from various Southern ports by water to New York where they are usually reloaded onto barges and moved to the treating plant docks at Port Reading, N. J. There are two docks at this point, each with three standard gage tracks. The ties are picked up and loaded onto flat cars for distribution into the seasoning yard. For purposes of checking the fifth car off of every barge is diverted to a special section in the yard for regrading. There is no particular purpose in taking the fifth car as any other car would serve the purpose equally well, but in order to facilitate the unloading and loading at the docks as well as to prevent possible confusion in switching and other

Fig. 4. The Ties Are Unloaded by Cranes and Placed in the Same Relative Position to the Rail That They will Occupy When in Track

operations, it was deemed expedient to have one particular car taken from each barge. The ties are loaded on this car just as they come from the barge, no attempt being made to secure a number of ties from each of the various grades. Thus on some cars the ties may be almost entirely 4's and 5's and on others, 1's, 2's and 3's and so on.

Yard Inspection Is a Technical Regrading

The regrading is done on racks or skids set alongside one of the tie storage yard tracks. There are seven of these skids, each consisting of two 33-ft. rails supported at the ends by cribbing and spiked to standard gage. The top of the rail is about 30 in. above the ground. The ties are unloaded on these skids by a locomotive crane and, are slid into a position corresponding to that which they would occupy in the track except that they are placed much closer together. In placing the ties, they are turned so that the smallest or narrowest face is uppermost. This arrangement permits the inspector to see the full length of three sides of the tie and the fourth side as well if he desires to turn it. The thickness and width of face in the rail bearing section of the tie can be checked readily by measurement since the supporting rails are in the same relative position to the tie that they would be when in track. The amount of wane and the general physical condition of the timber are also quickly apparent to the inspector. In other words, the arrangement has been made such as to make it as easy as possible to secure a thorough inspection and grading of all the ties on the skids.

When the ties are accepted by the field inspectors they are marked with a hammer on the ends with the letter R and a number corresponding to the inspector. One end inspection is used and the grade is indicated by the number of hammer marks made on the end of the tie. In

Fig. 5. The Yard Inspector Makes a Technical Regrading of the Ties on the Rack

shipping, this grade number is written on the end of the tie with crayon. In regrading, the yard inspector passes down between each row of skids, checking with crayon those ties that are properly graded or marking on the proper grade according to his inspection. Approximately 200 ties are re-graded at a time. The results of each car are made up by him into a report to the general tie inspector. This report is by individual cars and shows the name of the shipper or shippers, the name of the lighter, the number of ties or switch ties and classification, the number degraded and their sizes, the general condition of the timber, the quality of grading and the field inspector's number.

Some Results of the Re-grading

Some random reports for June 1 and 2 of this year show interesting results and are also indicative of the quality of field grading that is now being obtained. These are presented in the opposite column.

Other reports showed proportions of degraded ties to total ties on skids similar to the first two given. Following this yard inspection, the ties are re-loaded for distribution in the yard for seasoning.

This method of regrading samples of the incoming shipments to promote a more uniform inspection of ties in the field was put in operation at the Port Reading creosoting plant under the general direction and supervision of J. D. Landis, purchasing agent, and C. M. Taylor, superintendent, to whom we are indebted for the information contained in this article.

I.

8	No. 5's to	No. 4's		
6	No. 4's to 7-in.	No. 3's	Out of 174 No 5's, 4's and 7-in. No. 3's.	
2 7-in.	No. 3's to	No. 2's		
12 6-in.	No. 3's to	No. 2's	Out of 34 No. 3's (6x8).	
2 6-in.	No. 3's to	No. 1's		

30 ties degraded out of total of 208 ties on skids. This shipment all fresh cut ties. Mostly square hewn. Quality of timber generally O. K. Grading fair. Oak switch timber all fresh cut but split or checked more or less on ends. Inspected by—

II.

4	No. 4's to 7-in.	No. 3's	Out of 89 No. 5's, 4's and 7-in. No. 3's.
5	No. 2's to	No. 1's	Out of 101 No. 1's and 6-in. 2's.
4	No. 1's to	Rejects	

13 ties degraded out of total of 190 ties on skids. Cargo of square and round ties. Dry and green stock. Quality and grading of timber in general is good. Inspected by—

Take Proper Account of Rail Expansion

By Charles W. Baldridge
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

FEW PEOPLE realize how much of what we learn has previously been learned by generations which have preceded us. Those who have the privilege and the time to read through volumes of old journals and magazines of a technical character, are usually surprised to find that many of our problems of today were the objects of experiment and research in the past. This is particularly true of problems of railway maintenance.

Railway maintenance and operating officers learned long ago that troubles of various kinds are sure to follow the laying of rails tightly end to end in cold weather, and as a result of that knowledge, the use of removable shims to provide the necessary space for expansion of the rails in hot weather was adopted. In spite of that knowledge some railway officers are still experimenting with rails laid tight or with expansion allowances of less than the scientifically determined requirements.

Tight Rail Causes Sun Kinks

The most dangerous result from laying rails tight in cold weather is the "sun kink" of track which is likely to occur when warm weather arrives. A "sun kink" is a buckling of the track that occurs when the rails are too tight. The track shifts to one side of its proper location on the road bed. This puts a short, sharp curve in the track outward and back and usually leaves one end of the ties unsupported. Sometimes the track will jump almost off the roadbed, and occasionally these kinks will occur under a moving train. If a "sun kink" should occur under a train, or in an obscure place, or if for any reason a train while running at any considerable speed strikes a "sun kink" of the track, the result is quite sure to be a bad wreck.

The laying of rail tightly in cold weather is always followed by another result when hot weather arrives in the form of kinky and wavy track, which is of course bad riding track. It also makes it unsafe for maintenance men to do any track work which will loosen up or disturb the ties in the ballast, for fear a "sun kink" will result.

It is a common occurrence for section men to relieve the excessive stress in track due to too tightly laid rails, by taking out a rail on a very hot day and as soon as the rail has moved up all that it will to cut off enough of the rail taken out so that it will just fill the gap. As a rule, this transaction is not reported because the higher officers are likely to criticise the action, but if he is wise, the superior officer will approve the action, for failure to so ease up the stress in the rails is more than likely to cause a "sun kink."

Another result of the tight joints, at least in modern rails, is the chipping of rail ends, resulting in battered joints and rough riding track. In a large number of measurements made of the amount of space left for expansion, it has been found that most cases of chipped rail ends occurred where the rails are tight together. On the other hand comparatively few cases of this were noted where space for expansion was provided, and in most such cases examination showed that the rail ends had been tight at some previous time.

There is a positive lengthening of railway rails whenever their temperature is raised, and there is also a positive shortening of rails when they grow colder. This is strikingly shown by the fact that when rails are being manufactured, they are cut six inches or more longer than they will be when cold. Of course, these rails are cut while still red hot or at a temperature of several hundred degrees, but this shows more readily than do ordinary temperature changes what the expansion and contraction of steel mean.

The amount of the change in the length of a rail

is dependent upon the actual change in temperature of the rail itself, and when laying rails, the temperature of the coolest part of the rail should be taken by laying a reliable thermometer on the rail until the temperature reading remains constant for two or three minutes.

It is not necessary, of course, to take the temperature of every rail, for as a rule they are all of approximately the same temperature at any one time, providing that they are exposed to the sun and wind to the same extent. Sometimes some rails will be covered, or shaded, by weeds or grass while others are lying on open sandy ground. In such cases there may be quite a difference in temperature, which should be taken into account.

Some Rails May Be Warmer Than Others

If all the rails are uncovered and all are exposed in the same way to the sun and air, the temperature of all of them should be the same, within practical limits. As a rule, also, the temperature does not change very fast, so that the temperature readings need not be taken oftener than every 30 min. or more, depending upon weather conditions.

The foreman in charge of rail laying should be on the lookout for any sudden change of weather, or any change in the condition of the rails which might so affect their temperature as to make it necessary to change the size of shims to be used. Rails which have been unloaded in a pile at the end of a bridge or yard and more or less covered, as well as rails which have just been unloaded from a car, may differ considerably in temperature from rails which have been lying on the roadway exposed to the sun.

It is also a fact that in hot weather a rail is likely to be several degrees warmer than the air. A bright faced rail in track in a sandy cut in central Oklahoma, a few summers ago, showed a temperature of 142 deg. F., while the temperature of the air in the sun in the same vicinity was only 122 deg. F., and in the shade it was several degrees cooler.

This Is Not a Matter of Guess Work

The amount which rails will expand is not a matter of guess work or estimate, but has been determined by actual measurement with accurate instruments, scientifically handled. The amount which a piece of rail steel will expand for each degree "Fahrenheit" of rise in temperature has been found to be 0.0000065 of its own length. This is known as the co-efficient of expansion of rail steel. If the piece of steel is one inch in length, then the co-efficient becomes a decimal of an inch. If the piece is one foot long, the co-efficient becomes a decimal of a foot, etc.

The thickness of shims to be used in laying rails are most easily measured in fractions of an inch; therefore, to find what part of an inch a rail will expand for any given change of temperature, it is only necessary to multiply the length of the rail in inches by the co-efficient of expansion, as given above, which gives the lengthening of the rail for one degree. Then multiply the result obtained, by the number of degrees of rise in temperature which must be provided for, and the second result will be the amount, in decimals of an inch, which the rail will expand with the given rise in temperature.

It is not practical, however, to furnish shims of every thickness which would be required for all different temperatures. Therefore, it is better to adopt a set of shims of definite thicknesses and provide a table of temperatures showing between what limits the shims of each thickness shall be used. As shims must be made of hard metal, it is best to assume the natural fractions of an inch for our table, since iron and steel are usually rolled to such fractions as one-half, one-fourth, one-eighth inch, etc.

How to Calculate the Sizes of Shims Required

Therefore, for a 39-ft. rail, the change of temperature which calls for a 1/16 in. shim, is found by multiplying the length of the rail in inches, 468 by 0.0000065, the co-efficient of expansion. This gives us 0.003042 in. as the expansion of a 39-ft. rail for one degree change in temperature. One sixteenth of an inch turned into a decimal becomes 0.0625 in. Dividing this by 0.003042 in., the expansion for one degree, shows that a 39-ft. rail will expand 1/16 in. for each 20.54 deg. F. of change in temperature (practically 20 deg.). Assuming that a supply of shims differing by 1/16 in. in thickness will be furnished, it is only necessary to determine at what temperature rails can safely be laid tight, then provide for 1/16 in. increase in thickness of shim for each 20 deg. drop in temperature.

It may be necessary in some of the desert or sandy sections of the south and southwest to provide for rail temperatures of 140 to 150 deg. F., but in most of the United States, rail temperatures of 120 deg. F. are all that it is necessary to provide for, and in nearly all laying of rail, sufficient dirt, grains of sand, saw fins, and other irregularities will adhere to the ends of the rail at the time of laying, and will wear off or drop out after a few days use of the rail, to take care of the temperature above 100 deg. F. Therefore, an expansion table for 39-ft. rails should read:

Over 100 deg.—lay tight.
Use for lower temperatures:

1/16 in. shim when the temperature of the rail is from 80 deg. to 100 deg.
1/8 in. shim when the temperature of the rail is from 60 deg. to 80 deg.
3/16 in. shim when the temperature of the rail is from 40 deg. to 60 deg.
1/4 in. shim when the temperature of the rail is from 20 deg. to 40 deg.
5/16 in. shim when the temperature of the rail is from 0 deg. to 20 deg.
Do not lay rail when the temperature is below zero.

This lower limit is recommended because it is impossible to get work done accurately and correctly in such an open and exposed place as a railroad track, at an economical cost when the temperature is below zero.

There Is No Advantage in Laying Rail Tight

No advantage is gained by laying rail tight in cold weather to offset the disadvantages enumerated above. Some officers claim that battered end rails are due to the openings between rail ends left to take care of their expansion. That this is not the case is proved by the fact that very few chipped or battered end rails are found that have openings between them, and very few chipped or battered end rails are found but that are tightly together.

This does not mean, however, that any more space should be left between rail ends than is necessary to take care of the expansion which will occur. When rail is being laid it should be laid against traffic and rail anchors should be applied to every rail laid, before a train is allowed to pass over it, *and the proper thickness of shim,* to take care of the probable increase in the temperature of the rail, *should be used.*

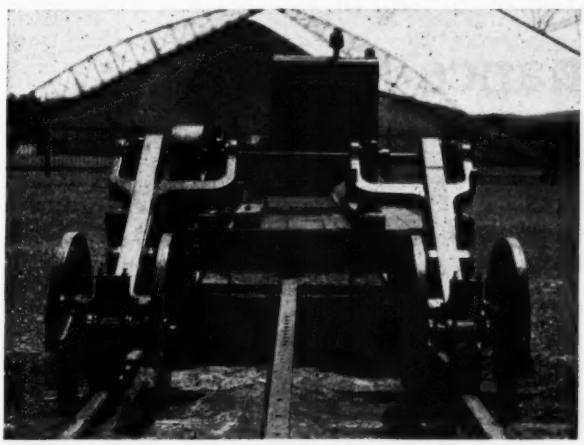
Accurate Adzing of Ties Secured By New Scoring Machine

Power Driven Saw Unit Developed on the Delaware, Lackawanna & Western Facilitates Track Work

IN ORDER to make it possible to secure accurate and uniform adzing of ties to level or other standard angles of inclination, A. J. Neafie, principal assistant engineer of the Delaware, Lackawanna & Western, has developed a special type of machine for scoring the ties. The machine operates power-driven circular saws that cut to predetermined depths on each side of the rail and can be regulated to give any desired depth of cut. Although still in an early stage of use, the machine has shown considerable possibilities for effecting marked economies in relaying rail or in tie plating by reducing the amount of labor, in addition to giving better track.

The saw unit consists of a push car upon which the power and other equipment are mounted. On the end of the car is a 15 hp., two-cylinder, four-cycle motor of the same type that is standard on the larger motor cars of the Lackawanna. This unit drives a countershaft mounted on the other end of the car. The drive is by belt over an idler or belt-tightening pulley.

A total of four circular saws are used. These are



Small Wheels Between the Saws Permit the Operator to Score the Ties to Any Desired Depth

mounted in pairs and each pair is driven from the countershaft with a separate belt. The saws have inserted teeth, are 27 in. in diameter and are spaced 16 in. apart, although this spacing can be varied if desired. The two saw heads are at the end of a heavy cast bracket which swivels around the countershaft, the saws being held up to their cutting position by a small double-flanged wheel set between them and running on the top of the rail. This small wheel can be raised or lowered with respect to the saw head, thus permitting a deeper or shallower cut as desired. Normally it is set so that the saws cut to the bottom of the tie-plates. The cast bracket or swivelled arm is in two pieces with a flanged joint between and contains a long shaft upon which the lower section or part carrying the saws can be turned. This permits the saws to turn around on the axis of the bracket and enables the operator to make the saws cut to certain designated but different depths on the inside and outside of the rail when desired. The joint is marked for level and for inclinations of 1 in 40 inward and outward, since these will be the cuts which will be used almost exclusively.

Since the machine is a portable one and must be used under traffic, another unit was developed so as to facilitate the lifting of the heavy saw units. This lifting unit consists of a second push car upon which there is mounted at the rear a metal rack inclined downward to

The Saw Units Are Raised by Pulling the Two Cars Together, Causing the Elevation Wheels to Run Up the Inclined Racks

the rear and exactly over the rails in the track. To each of these racks, there is attached a section which could be dropped down onto the top of each rail. When it is desired to lift the saws for moving the unit, a small cable is attached to the saw car and this car and the rack car are then pulled together by the aid of a small winch mounted on the deck of the rack car. This causes the small wheels between the saws to run up the inclined section of the rack and onto the top of it where the saws are held by hooking the two cars together by a rigid coupling bar of the proper length. The dropped section

The Saw Units Raised For Transporting the Machine

of the rack is then lifted by hand and the unit is ready to be moved. In operation the saw unit is coupled to the rack car by a longer coupling and the two are pulled by a motor car. The rack car is also used for carrying the necessary track tools.

Before using the machine on the track, the ballast is swept or pushed away from the ties so that it will not foul the saws. The entire unit is operated at a speed of

from two to four miles an hour, the saw teeth scoring the ties on the inside and outside of both rails, the depth of cut being that of the bottom of the tie plate. Thus in passing over new ties in which the tie plates have not as yet imbedded themselves, the ties are not scored, but on old ties where the tie plates have cut down into the tie, the saws score to the depth necessary to give a new tie plate surface without any adzing beyond that which is necessary. Since the saws are supported by a wheel running on the top of the rail and practically over the tie that is being cut, the depth of the scoring is independent of the condition of the track. The accurate scoring made by the saws on the inside and outside furnish an accurate guide for adzing either with the rail in or out of the track and thus eliminates one of the handicaps to good track as it practically insures the proper surface for the tie plate.

Normally ties are adzed by guesswork with the result that the surface upon which the tie plate rests, while appearing to be level, may vary anywhere between the limits of 1 in 20 or more inward and outward and with a greater depth immediately under the rail.

The standard cant on the Lackawanna is 1 in 40 and has been secured heretofore by adzing the ties to that cant at the treating plant. The new standard plate for 130-lb. rail has a 1 in 40 inclination in the plate and this amount of cant will be used on tangents, with a cant of 1 in 20 on curves, the same plate being used throughout. Thus all ties on tangents will be adzed level, while those on curves will be adzed to 1 in 40 inward, the combination of a 1 in 40 plate and 1 in 40 adzing giving the desired 1 in 20. The arrangement for tilting the saws enables the operator to adjust the machine quickly to secure the proper scoring for the above purposes. If, in addition, it is desired to keep the rails perpendicular through switches and still use the same tie-plates, the saws can be tilted outward to score to an outward 1 in 40 cant which would offset the 1 in 40 cant of the plate inward.

When in Operation the Inclined Racks Are Removed and the Two Units Pulled by a Motor Car

The tie-scoring machine, described here, was designed and developed by A. J. Neafie, principal assistant engineer of the Delaware, Lackawanna & Western, and application for patent on it has been made. The construction was handled by the American Saw Mill Machinery Company, Hackettstown, N. J.

Modern Maintenance Methods Bring Economies*

By F. T. Beckett

Engineer Maintenance of Way, Second District, Chicago, Rock Island & Pacific, El Reno, Okla.

THE FIRST essential to good track is good drainage. In the old days this class of work was done, if at all, by men by hand, or by work train and men; later it was done by teams using various kinds of scrapers and machines, but within the last eight years teams and hand work have been replaced by the steam ditcher and the ditcher spreader.

Ditching by hand costs, at the present rates of pay, 50 cents to one dollar per cubic yard, by teams 30 to 50 cents a cubic yard and by a steam ditcher 22 to 25 cents a cubic yard, loaded from cuts and unloaded on fills, or 11 to 12½ cents per cubic yard of excavation or fill, taking the dirt from where it is not wanted and placing where needed, a saving of some 19 to 39 cents on every yard moved by the old methods. Then the ditcher spreader handles its yardage in shallow cuts and very low fills at some 2 cents per cubic yard.

Recently a roadmaster reported, "I moved $47,000 worth of dirt from my ditches in 7 days." A superintendent says: "I did more with the ditcher spreader in 5 days than I could have done with teams and by hand for $50,000." A ditcher spreader costs approximately $100 a day with crew, work train, interest, depreciation, etc.

On one 100-mile territory we spent $277,974 for maintenance in 1923 and $257,529 in 1924; for these same years the additions and betterments amounted to $132,000. We made an actual saving of $15,000 on derailments due to track and during 1924 operated for some $87,000 less than in 1923, handling practically the same business, or saving 15 per cent on both maintenance and additions and betterments.

Ties follow drainage in importance. The treatment of ties has prolonged their life so that instead of 10 per cent renewals per year the ratio is 5 per cent on some roads. This saving is assisted by adzing and boring before treatment, the use of tie tongs in applying, and tie plates. It costs a man hour to insert a tie and every one saved means more ditching, if needed, or other necessities. Wide standard banks means longer life for the ties.

Labor Saving Equipment Reduces Costs

The introduction of section and bridge and building motor cars to transport men to and from work, saves an hour and a half daily. At the average rate of pay, of 37 cents per hour this means a saving in time of 55½ cents per day per man. There are 3,785 men on maintenance work on the Second district who go to and from work on motor cars. This represents a monthly saving of $49,400 in lost time. It cost $8,753 to operate and maintain the 681 cars per month, including interest and depreciation, or $13 per car. The cost of an average motor car is $250.

Track liners costing some $10 to $12 each permit

*Abstracted from a paper presented before a conference of officers of the Rock Island System at Kansas City, Mo. on May 8 and published in the Rock Island Employes Magazine for June.

the lining of heavy ballasted track with 3 men as against 8 or 10 by the old strong-arm methods. On branch lines, where forces usually consist of a foreman and one or two men, the liner overcomes bad alinement without requiring all the neighboring sections to assist.

The rail laying machine (hand) saves 12 to 16 men on each rail laying gang. The tie tamping machines do with 8 men what requires 16 to 18 to do by hand and they do a 100 per cent better and more uniform job.

The weed mowing machine which operates on a motor car does work for $1.50 a mile that cost $8 to $12 by hand. The steam weed-burning machines kill the weeds in a 14-foot section of track at a cost of $13 to $15 a mile, requiring two trips per year, as compared with $60 to $80 per mile by hand.

Mechanical Facilites Reduce Labor

The treatment of water for boiler use on the Second district for 1924 effected a saving of $239,255.92 net. There are 202 water stations on the district, 44 of which treat the water. The cost of treatment including labor and material (chemicals) was $68,840.88.

At several points we have been able to reduce one pumper by the installation of 100,000 gal. tanks in lieu of 50,000 gal. tanks. At one point a saving of $1,000 per month was effected by installing a modern pumping plant at a cost of $55,000.

The installation of mechanical coaling plants has reduced the cost of handling coal from 28 cents per ton to 13 cents, based on six chutes converted into mechanical plants. We use 182,720 tons of coal at these six chutes per year. A modern 300-ton coaling station costs from $30,000 to $40,000.

The installation of mechanical cinder-handling plants means a saving of one-half to two-thirds the cost of work by hand. A mechanical plant costs little or no more than the old shovel pit. A single unit costs approximately $3,000, exclusive of track.

The laying of heavier rail is decreasing track failures and increasing train haul by reducing train resistance. Where we have good heavy rail, good ties and fair ballast, good ditches and banks our derailments are reduced to almost nothing and the time of crews on the road is reduced from 14 to 16 hours to 8 and 10 hours.

Living Conditions Improved

Direct losses by reason of health conditions warrant high expenditures. The three great scourges to laboring men are malaria, typhoid and typhus.

During the past 11 years we have reduced the malaria along our lines from a universal condition common to all in the malarial country to isolated cases. It has cost us no less than $704,678 to do this, by destroying the breeding and hiding places of the anopheles mosquitoes and protecting against them by screens, etc. We are told that men free from malaria are able to do more than twice the work of those suffering from it. We feel this is true and that we have spent our money well.

Typhoid is a serious disease, transmitted by insects and animals, the common house fly, rodents and man himself. Cleanliness, both internal and external, is the preventative and cure. Improved living conditions, sewage disposal and wholesome water furnished by our company, assisted by local surgeons and boards of health, have wrought wonders in the reduction of this curse, until cases among our employes are now scarce.

Typhus, the old-time dreaded camp fever, is almost forgotten. Frequent bathing and changes from soiled to clean clothing, together with clean homes, have put the "cootie" to rout. The cootie, grayback or common louse spreads typhus. He cannot stand clean bodies, clean clothes or clean homes and for this reason we are practically free from typhus in our camps and living quarters. We watch carefully labor coming to us from old congested communities.

The Reclamation of Lumber*

By O. A. Schultz
Chief Lumber Inspector, Chicago, Burlington & Quincy, Chicago

FOR MANY YEARS the Chicago, Burlington & Quincy has reclaimed and used second-hand lumber released from bridges, buildings, water tanks, coal chutes and for many other services by resawing to the sizes desired. When this material is removed from service, if there is no immediate need for it in the locality where it is released, it is sent to a central point; on the Lines West to Havelock, Neb.; on the Lines East to Galesburg, Ill., always in the direction of the haul of new lumber so as to avoid any back-haul or cross-haul. At these two points we have resaw machinery, consisting of a cut-off saw and a rip saw, which enables us to cut this to the proper sizes. This machinery is in charge of the store department. The machinery is located in the lumber yard and where it is necessary to send new lumber along with the second-hand in order to make carloads, it means less handling than if the machinery was located at a greater distance.

When this lumber is received it is unloaded and sorted in grades known to us as No. 1 second-hand and No. 2 second-hand. No. 1 second-hand is lumber that is fit for further service in its original size. No. 2 second-hand is lumber which must be reworked by cutting off the bad ends and sides before it can be used again. As we receive orders for this lumber it is cut into the various sizes ordered and shipped to the particular job it is ordered for. To re-work this lumber properly, we have a resaw-circular inserted tooth, 42 in. in diameter, with traveling carriage 40 ft. long, with head blocks every 5 ft. to enable us to cut all sizes and lengths of material, and a cut-off saw—swinging, with 36 in. blade, equipped with roller tables properly arranged to accommodate all sizes and lengths of lumber.

Before sawing this lumber it is necessary that all spikes, drift pins, nails or other metals be removed from the timbers. The lumber is then cut to the exact length and then taken to the resaw where it is cut to the sizes ordered. We find that such items as bridge ties, bridge stringers, bridge caps and sway braces can be very easily worked into lumber for the repair and building of stock yards, snow fences, heavy platforms, bulk heading, lumber for sidewalks, concrete forms and various other purposes. In many of these cases second hand lumber gives just as good service as new. We also find that pile butts, second hand piling or second hand telegraph poles can be reworked into such items as stock yard posts or fence posts or slabbed into lumber which is good for platforms or crossing planks.

During 1924, we reclaimed from these saws five million feet of lumber, at an average cost of $2.25 per

*Presented at the convention of the Purchases and Stores Section of the American Railway Association at St. Louis, Mo., on June 19.

thousand feet. This cost includes labor, power and necessary supplies for operation of the plant. The five million feet represents only the amount of lumber reclaimed by resawing and does not include any second hand lumber which is used in its original size and which does not go through our saw mill.

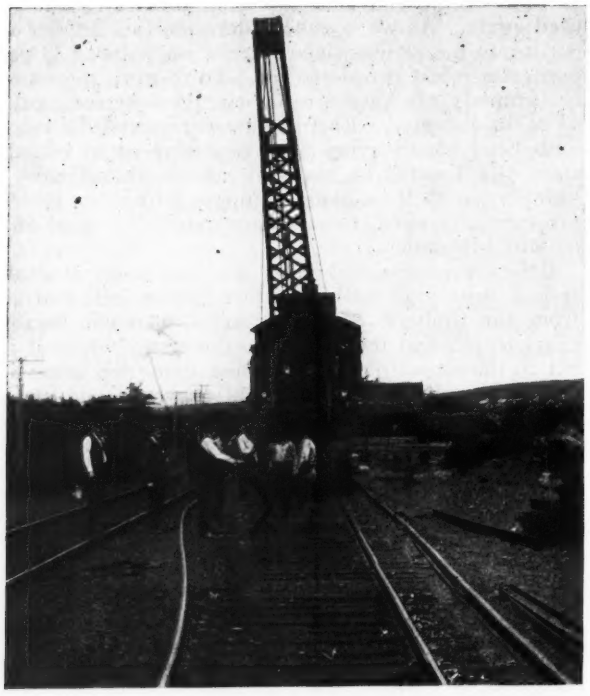
For accounting purposes we usually price the second hand lumber at two-thirds of the cost of new lumber of the same size and grade and add to this the cost of resawing, which as shown above is $2.25 per thousand feet. In the case of the Burlington, where we have to pay heavy freight charges on our lumber to foreign lines, it means that where our lumber is costing us from $25 to $35 per thousand feet, f. o. b. our tracks, the second hand lumber is figured at $17 per thousand feet, which with the $2.25 per thousand feet for resawing, makes our second hand lumber cost $19.25 per thousand feet. If we figure the average cost of our lumber at $30 per thousand feet, we make a saving of $11.75 per thousand feet, or a total saving on the amount of second hand lumber resawed during 1924 of $58,750.

The great difficulty is not to find a place to use the second hand lumber, but to find second hand lumber to be used in the places we already know of. We are constantly finding new uses for this lumber and also constantly issuing new lumber in places where second hand lumber might be used.

How One Road Releases Track for Heavy Maintenance Work

By L. P. Rossiter
Division Engineer, Lehigh Valley, Buffalo, N. Y.

FROM TIME to time within the past ten years various articles have been published in these columns describing the operations of laying rail, renewing bridge ties, reballasting tracks with pneumatic tampers, cleaning ballast with locomotive cranes and large screens, and similar operations that required the taking out of service of one track for the period of time necessary to complete the work and the handling of all traffic in both directions over the other track or tracks. In these articles the operations connected with the actual maintenance work have been described in considerable detail and no attempt will be made to repeat these descriptions at this time. However, that part of the operation which made all of this consolidated work possible, that is, the abandonment of the track and detouring of all trains over other tracks, and the benefits derived therefrom, have never been fully described.



With One Track Out of Service Locomotive Cranes Can Be Used to Greater Advantage

Where there are more than two main running tracks, with permanent crossovers and interlocking plants located at convenient intervals, or where there is a long passing siding adjacent to the track on which the work is to be done, the handling of traffic around the abandoned track section is a comparatively simple matter. Where there are only two main tracks, however, the taking out of service of one track is a serious curtailment of operating facilities and requires special arrangements to insure absolute safety and the least possible interference with train movements. It is this phase of the subject with which this article will deal.

In the first place when we on the Lehigh Valley begin planning for a piece of work of this character, we attempt to select the day in the week when the traffic over the particular track that we want will naturally be low. If we are fortunate enough to have a set of permanent crossovers, one facing point and the other trailing point, located reasonably close to the ends of the tracks to be abandoned, no extra work in this respect is necessary. If this happy combination does not exist permanently we make it so by putting in temporary crossovers as close to both ends of the work as conditions will permit. These temporary crossovers are properly constructed, connected up with the automatic signals and made just as safe in every way as if they were to remain permanently. They are generally kept spiked for main track movements except on the days when required for the detouring service for which they were installed.

Portable telephones are then connected up with the train dispatcher's line and we are ready to establish the single track operation on short notice whenever other conditions are suitable for the job for which it is prepared. Whenever it is necessary to establish such single track operation, a trainmaster or assistant is placed in charge of train movements, assisted by the work engine and crew who brought the men and equipment to the job. When the engine is required for use in connection with the work a gasoline motor car is used to convey the pilot over the temporary single track section. Immediately upon his arrival at the location of the job the trainmaster communi-

cates with the dispatcher by 'phone and at the opportune time authorizes the abandonment of the track desired and sets in motion the organization and arrangements for handling all traffic over the remaining track.

Flagmen are stationed at the crossovers at each end of the single line and at intermediate crossovers or junction points, if any, with instructions to permit no trains to enter this zone except upon instructions from the pilot conductor. When eastbound movements are to be made over the single track section the pilot remains at the west end of this section of track until the last train which he desires to send over, for the time being, has gone. He then follows this train to the east end and authorizes westbound movements until another change in direction of traffic is necessary or desirable. The trainmaster may or may not accompany the pilot on these trips but he does keep in close touch with the dispatcher at all times so as to direct the traffic over the single line to the best advantage. As soon as the abandoned track is again ready for service, the work engine assembles the equipment, the temporary crossings are spiked, the flagmen picked up and normal operations are resumed.

The advantages of the method as against doing all work under traffic are:

(1) It permits the use of machinery such as locomotive cranes, air compressors, etc., in the laying of rail which could not be used, economically, under traffic.

(2) It reduces, if not entirely eliminates, the loss of time by the maintenance forces clearing tracks and waiting for trains to pass.

(3) It permits of accomplishing in one day, work that would otherwise require several days, thus confining the interruptions to traffic to a few days instead of a long succession of days. This in turn reduces the aggregate delay to trains for the total maintenance work accomplished.

(4) In rail laying operations, it reduces the cutting of rail for connections to a minimum as only one such cut is made per day as against several, depending upon the traffic, when working under traffic.

(5) It permits the old track fastenings to remain undisturbed until the track is abandoned for the day and the new fastenings to be completed before the track is restored to service. This assures full protection and safe operation at all times.

(6) In the case of cleaning ballast, raising track for reballasting and other operations requiring skeletonizing track in hot weather it eliminates the possibility of derailments due to sun kinks occurring under or immediately ahead of trains.

This practice of giving up one track for the hours of the working day has been followed by the Lehigh Valley for the laying of all rail in multiple track territory; also for the renewal of ties out of face on long bridges, the screening of ballast with groups of two or more locomotive cranes and such work in which the frequent clearing of trains would involve serious loss of time.

By way of illustration of the kind of jobs that this method has made possible, the following are some of the most outstanding examples of what has been done on the Lehigh Valley within the last ten years:

(a) All of the ties on one track on the bridge carrying our line over the Susquehanna river at Towanda, Pa., were replaced in one day. This is a series of double track deck plate girder spans of a total length of 1808 ft. The total number of new ties placed was 1622 8 in. by 12 in. by 12 in. with elevation blocks, with a total volume of 160,612 ft. B. M.

(b) At another time all of the ties on one track of the bridge over the Delaware river at Easton, Pa., were renewed in one day. This is a series of double track deck truss spans having a total length of 1103 ft. The total number of new ties placed was 922.

(c) All of the 1925 allotment of new 136 pound rail for the system was laid between December 26, 1924, and March 18, 1925.

Altogether the advantages and economies that have been developed in these methods of performing maintenance work on the Lehigh Valley are so pronounced that neither our maintenance nor our operating people would consent to going back to the old methods.

Derailment on Lackawanna Results in Many Deaths

SAND AND EARTH washed on the tracks at a highway crossing during a thunderstorm early on the morning of June 16 resulted in the derailment of the special passenger train on the Delaware, Lackawanna & Western three miles west of Hackettstown, N. J., which caused the death of 55 persons and the injury of a number of others. The train was carrying a party of tourists from Chicago to New York, whence

Steam Escaping from the Locomotive Directly into the Interior of the Two Coaches Thrown Across It Resulted in Heavy Loss of Life

they were to sail for Europe. It consisted of two coaches and five Pullman cars, all of steel construction. The engine was a heavy Pacific type.

As nearly as can be ascertained, the accumulation of debris at the highway crossing resulted in the derailment of the four-wheel truck of the locomotive, the wheels of which struck a cross-over switch about 160 ft. beyond the crossing, causing the locomotive to swerve to one side and topple over in the ditch. The two coaches behind the locomotive were thrown crosswise of the track

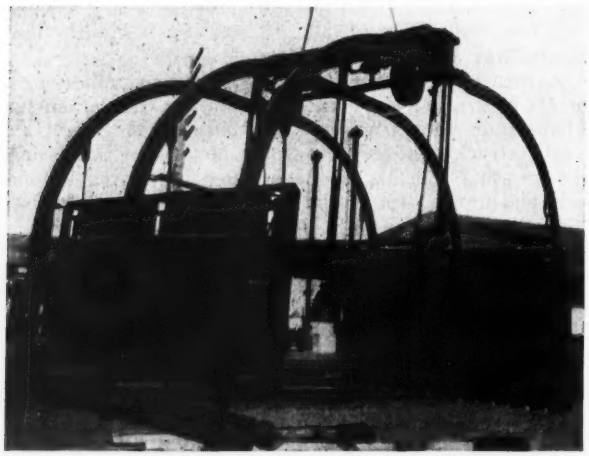
After the Worst Damaged Coach Had Been Removed

and came to rest directly on top of the engine. Both of them were rather badly buckled but the great loss of life was due almost entirely to scalding by steam escaping from the locomotive and filling these two coaches. The dead included the engineman, fireman, conductor, head trainman and a Pullman porter. Consequently it was difficult to get accurate information concerning the speed of the train at the time of the accident but such information as is available indicates the speed was between 40 and 50 miles per hour.

The accident occurred on what is known as the old line between Slateford Junction, N. J., and Port Morris. The track is laid with 105-lb. rail with tie plates, screw spikes, ties conforming to the high standard of the Lackawanna and ballasted with rock. The line is equipped with automatic block signals. The night was a stormy one, the whole countryside being drenched with a downpour which, in the vicinity of the accident, was said to amount to a cloudburst; in fact, the storm was so severe that many telephone lines were out of service in the vicinity of the accident.

Mechanical Unit Facilitates the Handling of Crossties

TO PROVIDE a means whereby railroad crossties could he handled mechanically and economically, there has recently been developed an interesting type of unit known as a tie lifter. This unit is suspended from the boom of a derrick or crane and, in operation, employs the same principal that is employed in the operation of a grab bucket, having two sets of parallel grapple arms that are opened or closed and lifted or lowered as desired by means of two drums and whips on the crane. The grabble arms consist of two sets of three arms pivoted on a common axis. At the bottom end of each set there is fastened a compensating grab-plate bar, through which 1½-in. in diameter piston bolts have been inserted on 6-in. centers. The inner end of each bolt is drop forged into a cup-shaped disk 5 in. in



The Lifter Automatically Compensates for Differences in the Length of Ties

diameter, the other being fastened to the plate by a 1½ in. nut. Around the piston bolt and between the cup shaped end and the compensating plate is a heavy coiled steel spring, allowing for a variation of from 4 in. to 5 in. in the length of the ties. Just above and parallel to the grab plate on each side, there is suspended a compression plate made of 3/16-in. tank plate properly reinforced to distribute any concentrated pressure. Each of these plates is attached to the grapple arms by six heavy coil springs which permit a compensating movement of from 4 in. to 5 in. These plates true up a pile of ties at the same time that the grab bars engage a load.

The inward and outward motion of the two sets of grapple arms, necessary to engage a load of ties and to

The Tie Lifter Operates in a Manner Similar to a Grab Bucket

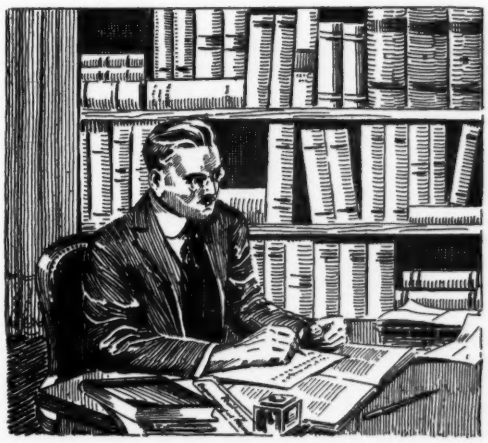
release them, is obtained by the action of a system of toggle arms fastened to the grapple arms about three feet above the grab-plate. These toggle arms, in turn, are actuated by two wire ropes which are attached to the two whips of the crane, the force of the tension in each rope being applied at the proper place through a system of sheaves.

The machine is 8 ft. 3 in. tall, not including the two wire ropes, is 11 ft. 4 in. long by 7 ft. wide overall and is designed to handle standard length ties, although by varying the length of the toggle arms a much greater variation in length may be compensated for. The new unit weighs between 2,800 lb. and 3,000 lb. without load and is designed to carry from 7 to 8 tons when fully loaded.

To load ties, the machine is swung out over a pile of ties which may be unlimited in length, the height of the pile being limited only by the length of the boom of the crane or derrick. The machine is lowered over the ends of the ties in an open position, after which the closing rope is taken up. This action closes the machine so that the piston bolts of the grab-plate engage the ends of the ties six or seven layers below the top of the pile. The contact of these piston bolts does not injure the ties, is positive in its grip and lifts any ties which come in contact with the cup-shaped disks or any ties which may repose above. Then when the hoisting rope is taken up further, the machine, with its load of from 40 to 50 ties, is picked up and swung over the car and the load deposited by lowering on the hoisting rope and taking up or holding on to the opening rope.

This tie lifting unit is manufactured by the Hussey Manufacturing Company, North Berwick, Maine.

What's the Answer?



This department is designed to serve as a reader's service bureau, wherein the many problems which arise in the routine maintenance of tracks, bridges, buildings and water service facilities, may be subjected to frank and thorough discussion. The value of the service thus rendered is proportionate to the extent to which readers avail themselves of it, in submitting questions and in lending their co-operation by offering answers to the questions presented.

Questions to Be Answered in September

To what extent should the track forces endeavor to drain away water standing in borrow pits or other depressions on the right of way beyond the toe of the embankment?

What are the advantages of wire glass and where should it be used?

How far is a section gang warranted in trucking dirt excavated in ditching in order to use it in widening banks?

What is the minimum allowable slope on a ballasted bridge deck to insure the effectiveness of a high grade membrane waterproofing?

Is there any merit in the application of oil to the faces of switch points to reduce wear?

What are the relative merits of riveted and screwed connections for pipe railings?

Is it worth while to match mark rail as it is released from track for relaying elsewhere?

What is the maximum rate at which treated water should rise in a settling tank to insure the removal of all matter precipitated by the chemicals?

Oiling Rails on Curves

To what extent is it possible to increase the life of rail on curves by using high carbon rail, by oiling the side of the outside rail and by other expedients?

High Carbon Rails Wear Longest

By C. W. Gennet, Jr.
Manager, Rail Inspection Department, Robert W. Hunt Company, Chicago.

Rails laid on curves are subjected to quite different wearing conditions than when laid on tangents. Theoretically the wheels of traffic "roll" on the rail on tangents and the loss of rail metal is due chiefly to simple friction between the steel of the rail and the metal of the wheels. On the high rail of the curves, there is a loss of rail metal due to the abrasion or grinding of the wheels on the rails, caused of course by the rails guiding the wheels around the curve. To a less noticeable extent this abrasive effect occurs also on the low rail, but there the twisting of the wheel on the rail head is probably of more importance and may cause considerable distortion as well as loss of metal from the head of the rail. The conditions on the high rail may be likened to the action of a file on metal, while on the low rail it is somewhat similar to the twisting of a glove on one's finger.

In view of these conditions, it must be obvious that the hardest rails acceptable under the specifications will be most desirable for curves. Carbon is the principal hardening element in the present basic open-hearth rail steel and any attention that can be given economically to laying high carbon rails (meaning those showing carbon near the top of the range permitted by the specifications) will certainly pay in the long run. The opposite of this is likewise true and consequently the indiscriminate use on curves of "A" or top rails of ingots that are almost invariably segregated or physically unsound, is a practice to be carefully avoided. "A" rails on the low side of curves are apt to show some very early distortion or flow and when on the high side very quick wear.

A test once made of this matter showed that on the average there was just twice the wear of "soft" rails that there was of "hard" rails laid on the low side of an 8½-deg. curve elevated 4½ in. Care was taken to select nine rails from heats whose reported analysis was 0.72 to 0.75 carbon and nine rails more from heats of 0.62 to 0.64 carbon. These were laid alternately and the resulting average loss of metal after 14,500,000 tons had passed was 0.19 sq. in. and 0.38 sq. in. respectively. Following their removal from the track the rails were carefully analyzed and the carbon from the corner of the heads of the hard rails was found to run from 0.64 to 0.77 with an average of 0.70, while the soft rails showed 0.53 to 0.64 carbon with an average of 0.60.

Several Suggestions Are Undergoing Tests

By J. DeN. Macomb
Office Engineer, Atchison, Topeka & Santa Fe, Chicago.

For the past year we have been segregating rails of high carbon and have been placing such rails on curves. The length of service of such rails has been so short,

however, that we have not yet secured any information regarding the effect of this measure. We hope, however, to make investigations during the summer which may show some results. We also segregate our "A" rail and do not permit them to be laid in curves.

During the past two years we have also put approximately 200 tons of Sandberg Sorbitic rail in service on sharp curves in the mountains. This rail has also been in service for so short a time, however, that we do not have any definite results from this test.

Flange Oilers Will Help

By E. D. Swift
Engineer Maintenance of Way, Belt Railway of Chicago, Chicago.

In one main line curve where the outside rail had been replaced on an average of once each year for a number of years, the life was extended to approximately 14 months before the last renewal by oiling the rail once a week. We feel that this practice undoubtedly contributed to the increase in life, although other factors also entered into it, such as a decrease of approximately five per cent in traffic and a reduction in the amount of superelevation of the curve.

The opportunity for reducing the wear of rail on curves and through switches by properly designed locomotive wheel flange oilers, especially on terminal roads and those with a large amount of curvature, deserves thorough consideration. While several adaptations of this idea have been in use for many years, some of them have been of limited value. Within the last year our company has equipped a number of locomotives with oilers which are now giving such good satisfaction in reducing the wear of wheel flanges that we are planning to extend the installation.

The use of flange oilers has generally been prompted by the desire to reduce wear on wheels and the corresponding reduction on wear on rails, which naturally accompanies wheel wear, has escaped attention or has been ignored, although under certain conditions the saving in reduced wear on rails and switches through the use of flange oilers may exceed the saving on the wheels. There is also the important possibility that that class of derailment which is comparatively frequent in terminal and yard operation and which is caused by locomotive wheels climbing the rail due to irregularities of line and surface, may be materially reduced through the use of flange oilers.

Engineer or Carpenter as Building Inspector

What are the qualifications of an inspector on contract building work? Should an experienced carpenter or carpenter foreman be assigned to this work or are younger members of the engineering force to be preferred?

Accounting Requirements Favor Engineer

By Frank R. Judd
Engineer of Buildings, Illinois Central, Chicago.

In considering the qualifications for a building inspector on contract work there are several points which should first be known before one can say who would make the best man. If the inspector is required to stake out all of the work and give all necessary levels and also to prepare monthly and final estimates for the contractor, accompanied by final notes, cross sections, etc., to support his final estimate, I think that a younger member of the engineering staff who has had a fair amount of experience in building work would make the best man. Also, on account of the detailed completion reports which are required by the Interstate Commerce Commission, I think that the engineer on the whole would be able to carry out the work to final completion in the best manner.

However, if the inspector's duties are to be solely in the nature of inspection of construction, materials, etc., with perhaps the making out of a daily and weekly report showing the force employed and the progress of the work, I think an experienced carpenter who has a wide knowledge of the different trades which participate in the construction of a building in these days would make the better man. However, the salary which we could pay to a competent mechanic would not be enticing as contractors are always on the lookout for such men, paying more money than a railroad.

Inspector Should Have Had Actual Experience

By C. A. Rodman
General Inspector, Bridges and Buildings, New York, New Haven & Hartford, New Haven, Conn.

I have always contended that a young member of the engineering force was not a proper man for inspector on contract building work. I believe, and have always insisted, that such an inspector should, at least, be of a grade of foreman or of equal qualifications and should have had actual experience in the construction of the buildings of the class that he is supposed to inspect.

Repairing Fences

Is it preferable to make fence repairs by section gangs or by special gangs?

Each Plan Has a Place

By H. R. Clarke
General Inspector Permanent Way, Chicago, Burlington & Quincy.

The answer to this question depends on what is meant by "repairs." If that term includes only small patchwork jobs, the section gangs should do it, but if it includes in addition to this, all fence work, such as rebuilding entirely or fencing right-of-way not fenced previously, a combination of the two is best.

In the past few years there has generally been a tendency to tighten up and a closer check has been kept on forces worked. On most roads the force being worked is smaller than the average force five years ago and while this smaller force is to some extent offset by labor saving equipment, treated ties and timber and improved track material generally, still the average roadmaster finds little time during the working season to put his section forces on fence work, so that little fence work is done with track men during the summer months.

Many men still active in maintenance work once considered fence work a winter job, and when the frost was so deep that track work was out of the question, the men repaired fences. In fact the need of such work was often used as an argument to support the request for a larger force. There has been the same tendency towards a smaller winter force that has been evident in the working season.

Maintenance men as a rule are strongly in favor of a steady uniform force and argue in favor of certain

kinds of work for winter to justify the holding of men. The officers responsible for the management of the roads may listen to the arguments of their maintenance men for a uniform force and appreciate the advantages of such a plan. However, they also know that on a large part of the railroad mileage of the country, work during the winter, handicapped by weather conditions, is more costly per unit than if done in favorable weather and it is hard to show that this cost is made up for by increased efficiency of the men in the working season. The result of the smaller forces, both winter and summer, has been that regular section forces have had no time for anything but track work and this condition has forced many men responsible for maintenance work to give thought as never before to the most efficient organization possible within the limits of their appropriations.

Many roadmasters have worked out a program for fence repairs just as they have done for other work, and have found that a well organized and properly equipped fence gang can handle the longer stretches of building or rebuilding fence better than the section gangs. Another point is that the fence will be built more nearly to standard.

With one fence gang on a roadmaster's subdivision or perhaps even on a superintendent's division, the larger fence jobs can be taken care of, leaving only the patch-work such as setting an occasional post, hanging a gate or tightening and repairing broken wire to be done by the section men.

A definite plan in fence work will result in more efficient work and economy as in any other operation and justify the combination of fence gang and section men. We certainly should not stop a fence gang for minor repairs any more than we would a large surfacing gang to "snipe" up a rough spot. The section men should handle the small jobs. Notice, I do not say in "their spare time," for with a properly organized and supervised force there is no such thing in the maintenance department under present conditions. The work is mapped out and every day planned and fence work fits into the plan.

With a fence gang handling the larger jobs, the men acquire skill in the work, and the gang can be equipped with proper tools. There is a decided saving in this item alone as compared with furnishing fence tools to every gang as is often done when each gang does the fencing on its own section.

One of the most important savings is in material. With each section gang doing fencing, material is ordered and not used for months. The foreman or roadmaster thinks he can begin repairing fences soon and orders material; in the meantime the force is reduced or emergency work comes up and the fencing is not done but the material comes and often we see it lying for months before actually used.

Section Gangs Preferred

By J. B. Martin
General Inspector of Track, New York Central, Cleveland, Ohio.

There are probably certain territories where fence renewals and repairs are so extensive and urgent or climatic conditions are such that it is advisable to organize special gangs for this work, but on most railroads the conditions and climate will permit this work to be done by the section gangs during the late fall and winter months. Experience has shown that this is the most economical method and the work is as well done by section gangs as by special gangs. With the use of special gangs, the added expense for overhead and for moving and traveling must be considered, which expense is eliminated when the work is done by section gangs. There is also the further advantage that this method provides a little more year-round employment on the sections which makes a more stable and efficient force.

Section Gangs Preferred

By V. H. Shore
Yard Foreman, Atchison, Topeka & Santa Fe, Dodge City, Kan.

It is both practical and preferable to make ordinary repairs to right-of-way fences by section gangs. Track-walkers look out for the condition of the fence along the sections and take care of light repairs such as a broken wire or missing staples allowing the wire to sag too much, loose cattle guards and broken boards on wing fences. They report to the foremen the conditions they cannot take care of alone and either the gang or the necessary number of men are detailed to repair the same. Special gangs could hardly take care of the numerous small repairs that show up daily over a general foreman's territory and this method would result in many more stock claims than we now have where the section foreman looks after the repairs.

A Foreman's Experience

By Alex Antymnink
Section Foreman, Canadian National, Riverhurst, Sask.

It is my conclusion after 16 years' service as a laborer and foreman in a section gang that it is preferable for each section gang to maintain the fence on its territory, adding extra men to the section forces if necessary. If an extra gang is employed for this work it must be provided with camp cars, which must be moved by train from one siding to another, all of which is expensive.

Dust Boxes Are Not Favored

Does the deterioration of roller expansion bearings on steel bridges and the expense of keeping them clean justify the added cost of providing dust boxes around such bearings on new bridges?

Prevailing opinion does not favor dust boxes, not only from the standpoint of an unwarranted expense, but also because of certain inherent objections to the use of such boxes. B. R. Leffler, engineer of bridges, New York Central, lines west of Buffalo, states that his experience does not indicate enough deterioration of roller bearings to justify the cost of such boxes. C. N. Bainbridge, engineer of design, Chicago, Milwaukee & St. Paul, has found the boxes unsatisfactory because the enclosing of the bearings discourages frequent inspection, with the result that the rollers and bearings may become seriously rusted before the condition is discovered.

In the opinion of O. F. Dalstrom, engineer of bridges, Chicago & North Western, a satisfactory condition of the bearings may be more readily assured by so designing the bearing that the bed upon which the rollers rest is made self cleaning. He has found that the series of slots cast in the face of the bearing shoe parallel with the axis of the bridge will serve as a dust catcher for dust or other foreign matter which is deposited from time to time on the face of the bearing and thus keep it reasonably clean of such accumulations.

There may be special conditions, as in the case of highway bridges in a particularly filthy location, where the accumulation of dirt from the highway may be so rapid as to require some form of shield or box around

the bearing to keep the rollers reasonably free of foreign matter, but whatever measures are taken, they should not be assumed as warranting any decrease in the frequency of inspection or cleaning of the bridge gearings by the maintenance force.

Overloading Motor Cars

What practical measures can be taken to prevent the overloading of motor cars?

Many Considerations Are Involved

By G. H. Ordas
Supervisor of Motor Cars, Chicago, Milwaukee & St. Paul Railway Co.

The writer is at a loss to suggest any automatic means of preventing the overloading of this equipment, other than to enforce established rules. Since the safe load for any motor car depends on many variables, such as the grade of the materials used in its construction, the proper application of the materials, the age and service to which the equipment has been subjected, the kind of load put on the car, how it is located and the speed at which it is to be hauled, it is difficult to say when any car is overloaded. Many operators of motor cars apparently are of the opinion that the capacity of the car is the load the power unit will start and keep moving, which is erroneous and should be corrected.

Most manufacturers specify the capacity of their cars and some stencil that capacity somewhere on the car. That capacity should never be exceeded when the car is new, or when maintained in proper condition by the replacement of parts that have worn or become weakened by other causes. Wheels, axles, bearings, and other frame parts must be in perfect condition to carry capacity loads.

Operators of motor cars should be advised of the capacity of the cars they are to operate, and they should never exceed that loading. Ordinarily the capacity of any motor car is the number of men that can be seated on it comfortably, allowing sufficient room for their light tools. All loads in excess of this should be *pulled* on a trailer behind the motor car, the trailer to be attached to the motor car by an approved coupler; not by chains, wire, rope or other fastening that would permit the lift handles getting caught up on each other and drop the wheels off the track.

Officers should hold motor car operators responsible for the safe condition, operation, speed, and loading of their cars, and dismiss those who do not comply with instructions. Equipment which is not in safe condition should be taken out of service until put in proper condition. Overloading and equipment is dangerous and should not be permitted.

Proper Instructions Will Solve Problem

By W. F. Baker
Contractor for All Gas Engine Equipment, Missouri-Kansas-Texas, Dallas, Tex.

The question of overloading motor cars has to be dealt with the same as other problems on a railroad such as the conservation of materials, keeping labor costs at a minimum, protecting equipment and tools, etc. In any line of work there must be confidence and co-operation to get results. So it is with keeping motor cars from being overloaded.

In nearly every instance our experience with motor car operators is that they, through the proper method of instructions and co-operation, will not overload their cars. A few foremen are inclined to load their cars with ties, rail, etc., but when they are shown that they will not receive a car to replace one worn out in this manner, they are more careful and will use their push car as a trailer. If the bridge and building section foremen are not furnished with push cars, they have an alibi and will inevitably abuse the opportunity of quick transportation.

The greatest amount of overloading motor cars occurs in the car department, in our opinion. This can not be attributed entirely to the operator. They feel a hesitancy in handling all of their material by passenger train, as it causes too much lost time for them; consequently they load motor cars with various repair parts and take it from 10 to 35 miles to make road repairs. We know of no way to combat this unless they make shipments by baggage and lose some time in waiting. However, after passenger shipment is made their work is not always near the station and this still necessitates loading the material on a motor car in order to reach the point where work is to be done.

As stated above we rely on the foreman's willingness to take care of his motor car and if after some time we find that he continues to overload his car when not absolutely necessary he is relieved from service. This may not be the practical method of stopping the overloading of motor cars, but it is the nearest sure way that we know of.

Use a Trailer

By V. H. Shore
Yard Foreman, Atchison, Topeka & Santa Fe, Dodge City, Kan.

The overloading of motor cars can be eliminated by using a small trailer car to carry heavy tools and to carry men when the number exceeds the seating capacity of the motor car. The trailer should be made with the seat running lengthwise of the car and wide enough for four or six men to sit with backs together. Tools can be placed beneath the seat and along the sides, small sideboards being fastened to the car to keep the tools from falling off along the track.

The Care of Switch Lamps

To what extent is it practical for a foreman to concentrate the care of switch lamps in one man? What are the advantages and disadvantages?

It Depends on Conditions

By T. F. Donahoe
General Supervisor, Baltimore & Ohio, Pittsburgh, Pa.

The care of switch lamps is very important. Where automatic signals are in use all switch and signal lamps should be taken care of by a lampman under the signal maintainer. Where there are no automatic signals, the trackwalker on each main line section should be delegated to look after all the lamps on the section, filling and cleaning them twice a week and checking them over each time he passes. This also applies to the larger yards, except where the yards are large enough to keep one man busy, when a special man should be put in charge of the lamps. The advantages of a regular lampman with the signal maintainer is that it allows two men to work together, so that they can operate a motor car. This also allows one man to be in training for the position of assistant maintainer, and is an incentive to a better class of men. When the lamps are taken care of by the trackwalker, he can inspect the lamps as he

goes along, thus saving the time of a second man covering the same territory. In large yards where lamps are close together nothing is saved by having the trackwalker take care of the lamps, as it divides his time so much that he is liable to overlook some of his regular track inspection.

One Man Preferred

By V. H. Shore
Yard Foreman, Atchison, Topeka & Santa Fe, Dodge City, Kan.

It is customary in large yards to assign one man to care for switch lamps. There are several advantages in this method. It is impossible to fill and clean all lamps in a large yard in one day and as lamps equipped with long time burners burn from three to four days, the yard can be divided into sections and one-third of the lamps cleaned each day, thereby covering the yard twice a week. When this work is assigned to one man he knows where he leaves off each day and where to begin work the next and requests for supplies can best be looked after in this way. This man becomes experienced along this line and the lamps give better service.

It is also practical to have one man look after lamps on outlying sections where there are but a few lights. This is usually done by the trackwalker, lamps being filled and cleaned twice each week and inspected daily. I know of no disadvantages in assigning this duty to one man.

One Man An Advantage

By L. M. Nayr
Foreman, Central of New Jersey, Somerville, N. J.

The advantage of having one man maintain switch lights is that he is more likely to take better care of them than if different men did the work, as the tendency would be for each man to get over them as soon as possible and leave as much as possible for the next fellow. This would mean dirty lamps and broken chimneys and when complaints came in each of the men who maintained the lamps would try to put the blame on the others.

Carpenter Shop for Bridge Forces

What work required by carpenter forces can be done most effectively in a small carpenter shop at division headquarters and what tools or equipment should be provided?

Carpenter Shops Are Desirable

By M. H. Doughty
Division Engineer, Delaware, Lackawanna & Western, Hoboken, N. J.

On any division where there is a large number of structures, particularly structures largely of wood construction, or requiring considerable carpenter work, it is advisable to maintain a small carpenter shop equipped with the necessary work benches, vices and small tools where a carpenter or carpenters can perform by hand such minor carpenter work and cabinet work as may be necessary. Such a shop should be located, if possible, adjacent to the shops of the car department whenever the division has such a shop.

Where a planing mill and wood shop is maintained by the mechanical department, it is more economical to have the necessary machine work for the bridge and building department handled through the mechanical department shop. On a division where no wood shop is maintained by the mechanical department and where a large number of structures are to be maintained which require carpenter work, it is economical to maintain a small wood shop for carpenters. The equipment for this shop should include a small band saw, a small circular saw and suitable machinery for mortising and tenoning and for the manufacture of parts for doors and sashes.

Division Shops Are for Light Repairs

By J. C. Patterson
Regional Engineer, Erie, Jersey City, N. J.

A division carpenter shop should be used only for miscellaneous light repairs to building accessories, such as sash, skylights, doors, etc., and also furniture. A universal woodworking machine, operated by an electric motor and equipped to do the following work is the best machine:

Cross cut	Bore
Rip	Rabbet
Dadoe	Plough
Plane	Mitre
Bevel	Tenon
Joint	Moulding

Where it is desired to do heavier work in a carpenter shop, such as framing bridge timber and resawing lumber, the following equipment should be installed:

1 Tie dapper
1 Saw mill with 20-hp. motor and carriage for 30-ft. by 12-in. by 12-in. timber
1 Boring machine
1 Heavy planer, matcher and moulder
1 Cut-off saw operated with a motor and equipped for sawing 15-in. by 15-in. timber.

I do not recommend carrying on heavy work of this character in a division carpenter shop. We have found it to our advantage to frame bridge ties at the point where used, as the work can be done as quickly at this point as at any other and there is no danger of making mistakes in framing, which often occur when framing is done at a point remote from the bridge.

There is no advantage in doing work which is ordinarily carried on in a saw mill or planing mill, by division carpenter forces. It is always cheaper and more satisfactory to buy this lumber already milled.

Vegetation in Reservoirs

What can be done to prevent the growth of vegetation in reservoirs?

Local Conditions Determine Remedy

By Water Service Engineer

Broadly considered, vegetation encountered in drainage basins, reservoirs, small lakes or other similar sources of water supplies for railroads is of two kinds, weed growth and algae growth, the latter comprising organic material which thrives and accumulates on the surface of the water or in large quantities along the shore line or edges of ponds, etc.

The removal of algae growths is often an annoying problem as where the reservoir is so shallow at times as to permit of this algae entering the suction line or where its rank growth renders unfit for use a water supply which is needed for drinking purposes as well for locomotives; but its removal is relatively simple. Copper sulphate has been found to be an efficient agent for the destruction of this life. According to the Bureau of Fisheries of the Department of Commerce it has been determined that one part of this chemical (blue vitriol) in 5,000,000 to 10,000,000 parts of water will kill many

of the common undesirable forms of algae. On account of the toxicity of copper sulphate for fish, however, great care must be exercised in its use in order to avoid killing fish, where fish are present and their destruction is either forbidden or not desired. It has been established that one part of this salt in 3,000,000 parts of water will not kill such fish as suckers, carp, bass, yellow perch and sunfish but that trout are less resistant to the poisonous action of copper sulphate, although a dilution of one part of the chemical to 7,000,000 parts of water has been found safe for this species. Where fish are present, preliminary treatment on a small scale, as in pails of water or tubs, will determine the maximum concentration of copper sulphate that it is safe to use without troubling fish life. Experience indicates that one part of copper sulphate in 2,000,000 parts of water is sufficient to destroy most of the objectionable forms of organisms while some are rapidly destroyed with an application of only one part in 20,000,000.

In these minute quantities no harmful effect can arise from its use in drinking water and considering that few applications are needed during the season and that a large portion of the copper sulphate is precipitated with the organisms or with the lapse of time, or by reason of the presence of mineral salts in the water, there is ordinarily no objection to its use under proper supervision. The method of application is usually one of dragging sacks containing copper sulphate back and forth through the pound in a more or less systematic manner. One part of chemical to 1,000,000 parts of water corresponds to eight parts of chemical to 1,000 gal. of water, which is a measure useful in determining the quantity of copper sulphate needed.

The removal of weeds from reservoirs is a more difficult problem owing usually to their more deep rooted nature, some weeds growing rankly in depths of six feet or more of water, although trouble from vegetation ordinarily is encountered only in those instances or places where the water is shallow. While copper sulphate deserves consideration in connection with the removal of weed growth, all depending on the type of weeds, it is seldom considered an effective eradicator. Often the only solution is to remove the weeds bodily by draining out the water periodically and cutting them down. Two important factors in determining the growth of weeds in reservoirs are the presence of a muddy bottom and plenty of sunlight. Where the reservoir is not too large and the bottom is muddy, it will often suffice to deposit sand over the reservoir basin, sand usually affording an unfavorable culture for the growth of water weeds. Where the reservoir is relatively small it may often prove advisable to cover the reservoir with some type of roof. By excluding sunlight, covered wells usually constitute a highly efficient inhibitor of plant life. One other avenue of investigation in connection with the destruction of weed life in reservoirs or streams is the creation of a higher velocity of flow, since it is seldom that weeds will prove troublesome in a water that is kept flowing to some degree. It is evident from this discussion, however, that each problem must be considered in the light of the various conditions present. The fact that each of these methods has proved useful if not entirely successful in many instances of trouble of this kind, makes them worthy objects of consideration in such a study.

NEW AUSTRALIAN ROAD—Work has been started in Australia to link Brisbane, Queensland, and Sydney, New South Wales, with a railroad of uniform gage so that travelers will be able to make the trip without changing trains at the state border.

With the Associations

The American Railway Engineering Association

The Board of Direction met at Montreal, Que., on June 24, meeting with the general committee of the Engineering Division of the American Railway Association in the afternoon of the same day.

The next annual convention will be held in Chicago on March 9-11. Among the plans in contemplation are a joint session on either the opening or the closing day with the Signal Section of the American Railway Association.

Arthur Ridgway has been elected a director to fill the unexpired term of A. M. Burt, deceased.

The Roadmasters' Association

The officers and members of the executive committee and the chairmen of several of the other committees met at the Hotel Baltimore, Kansas City, Mo., on June 27, to plan for the next convention and to consider the reports of committees. Details were perfected for the forty-third convention which will be held on September 22-24. The reports of the standing committees were presented in practically final form.

Metropolitan Track Supervisors' Club

The Metropolitan Track Supervisors' Club held its annual meeting on June 4 at Bear Mountain on the Hudson river. The meeting was in the form of a combined meeting and outing for the members and their families. The party went to Bear Mountain by steamer, where following a luncheon the business meeting was held with J. V. Neubert, engineer maintenance of way of the New York Central as the principal speaker. An inspection of the Bear Mountain suspension bridge was also made, following which the party returned to New York by steamer.

Track Supply Association

The large number of requests for space which have been received by W. C. Kidd, secretary-treasurer of the Track Supply Association, indicate that the exhibit will equal that of any previous year in magnitude and diversity of exhibits. More space will be available for the exhibit this year than ever before owing to the fact that both the convention and the exhibit will be held in the municipal convention auditorium with the exhibits immediately adjacent to the convention room. A total of 37 firms have already made arrangements for 49 spaces as follows:

Air Reduction Sales Company, New York.
American Chain Company, Bridgeport, Conn.
American Hoist & Derrick Company, St. Paul, Minn.
American Valve & Meter Company, Cincinnati, Ohio.
J. C. Barr, Boston, Mass.
Bethlehem Steel Company, Bethlehem, Pa.

Buda Company, Chicago.
Chicago Railway Equipment Company, Chicago.
Creepcheck Company, Inc., Hoboken, N. J.
Crerar Adams Company, Chicago.
Duff Manufacturing Company, Pittsburgh, Pa.
Fairbanks, Morse & Co., Chicago.
Fairmont Railway Motors, Inc., Fairmont, Minn.
J. R. Fleming & Son Company, Scranton, Pa.
Hayes Track Appliance Company, Richmond, Ind.
Hubbard & Company, Pittsburgh, Pa.
Ingersoll-Rand Company, New York.
O. F. Jordan Company, East Chicago, Ind.
Kalamazoo Railway Supply Company, Kalamazoo, Mich.
Lundie Engineering Corporation, New York.
Maintenance Equipment Company, Chicago.
Mudge & Company, Chicago.
National Lock Washer Company, Newark, N. J.
Oxweld Railroad Service Company, Chicago.
P. & M. Company, Chicago.
Pocket List of Railroad Officials, New York.
Positive Rail Anchor Company, Marion, Ind.
Q. & C. Company, New York.
Rail Joint Company, New York.
Railroad Supply Company, Chicago.
Railway Engineering and Maintenance, Chicago.
Railway Review, Chicago.
Ramapo-Ajax Corporation, Hillburn, N. Y.
Sellers Manufacturing Company, Chicago.
Templeton, Kenly & Co., Ltd., Chicago.
Verona Tool Works, Pittsburgh, Pa.
Western Wheeled Scraper Company, Aurora, Ill.
Woolery Machine Company, Minneapolis, Minn.
Wyoming Shovel Works, Wyoming, Pa.

In addition four firms have applied for membership without space:

Morden Frog & Crossing Works, Chicago.
National Malleable & Steel Castings Company, Cleveland, Ohio.
Pettibone, Mulliken Company, Chicago.
St. Louis Frog & Switch Co., St. Louis, Mo.

Directory of Associations

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, secretary, 319 North Waller avenue, Chicago. Next convention, Buffalo, N. Y., October 20-22, 1925.

AMERICAN RAILWAY ENGINEERING ASSOCIATION (Works in co-operation with the American Railway Association, Division IV).—E. H. Fritch, secretary, 431 South Dearborn street, Chicago. Next convention, Congress Hotel, Chicago, March 9-11, 1926.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—E. J. Stocking, secretary, Room 1146 Otis Bldg., Chicago. Next convention January, 1926, Cleveland, Ohio.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—B. J. Wilson, Pocket List of Railroad Officials, 605 Fischer Building, Chicago. Annual exhibit at convention of American Railway Bridge and Building Association.

NATIONAL ASSOCIATION OF RAILROAD TIE PRODUCERS.—J. S. Penney, secretary, T. J. Moss Tie Company, St. Louis, Mo. Next convention January, 1926, Hot Springs, Ark.,

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, secretary, Seeberger Building, 825 South Wabash avenue, Chicago. Annual exhibition at convention of American Railway Engineering Association.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—T. F. Donahoe, secretary, 428 Mansion street, Pittsburgh, Pa. Next convention September 22-24, 1925, Kansas City, Mo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo-Ajax Corporation, Hillburn, N. Y. Annual Exhibit at convention of Roadmasters' and Maintenance of Way Association.

LABOR DECISION REVERSED—The United States Supreme Court, in a decision rendered on June 8, reversed that the federal district court of Chicago directing D. B. Robertson, president of the Brotherhood of Locomotive Fireman and Enginemen, to appear as a witness in response to a subpoena issued by the Railroad Labor Board. The lower court held that the law intended to permit the board to apply to any district court to enforce its subpoenas or compel attendance of witnesses.

The Material Market

WHILE the estimated production of steel in the United States for the first half of 1925 is 22,000,000 tons or only 1,000,000 less than the first half of 1923, this record was obtained only because of the enormous production during the early months of the half year, there having been a gradual decline throughout most of the period. On the whole, the market continues quiet although such changes as have taken place either in demand, production, or prices, are the results of the gradual development. A further influence of the lessening demand is definitely manifested in the comparison of prices for June with those of May since there have been adjustments all along the line. The demand still continues more active in the middle west than in the east and the middle western manufacturers are feeling more and more the influence of competition from producers in the Pittsburgh territory. Current prices for iron and steel products relating to maintenance of way and structures are shown in the table below.

PRICES PER 100 LB.

	May			June		
	Pittsburgh	Chicago		Pittsburgh	Chicago	
Track spikes	$2.80 to $3.10	$3.00		$2.80 to $3.10	$2.90 to	$3.00
Track bolts	3.90 to 4.25	4.00		3.90 to 4.25	3.90 to	4.00
Angle bars	..... 2.75	2.75		..... 2.75	.....	2.75
Tie plates steel	2.35 to 2.40	2.35		2.35 to 2.40	.....	2.35
Boat spikes	..... 3.25	3.25		..... 3.25	.....	3.25
Plain wire	..... 2.50	2.60		..... 2.45	.....	2.50
Wire nails	..... 2.75	2.85		..... 2.65	.....	2.75
Barb wire, galv.	..... 3.45	3.55		..... 3.40	.....	3.50
C. I. pipe, 6 in. to 12 in., ton	....	46.70		....	.....	47.70
Plates	2.00 to 2.10	2.20		1.90	2.14 to	2.20
Shapes	2.00 to 2.10	2.20		2.00	.....	2.20
Bars, soft steel	2.00 to 2.10	2.10		2.00	.....	2.10
Rivets, struct.	2.55 to 2.60	2.75		2.40 to 2.50	.....	2.65
Conc. bars, billet	2.00 to 2.10	.....		.....	.....	.....
Conc. bars, rail	.....	2.10		.....	.....	2.00
Rail, per gross ton f. o. b. mills	....	43.00		....	.....	43.00

The prices for scrap are continuing to show an upward trend which has been in progress since some time in April.

PRICES PER GROSS TON AT CHICAGO

	May	June
Relaying rails	$26.00 to $31.00	$25.00 to $26.50
Rails for rerolling	17.00 to 17.50	17.50 to 18.00
Rails less than 3 ft. long	17.50 to 18.00	18.00 to 18.50
Frogs and switches cut apart	15.50 to 16.00	16.25 to 16.75
Steel angle bars	16.50 to 17.00	17.50 to 18.00

The lumber market continues quiet, although reporters of market conditions in the lumber field are encouraged with respect to the prospects for the summer months. However, the manifestations upon which this feeling is based have not had any other effect than to hold up further reductions in prices which have been practically stationary during the past month.

SOUTHERN PINE MILL PRICES

	May	June
Flooring, 1x4, B and B flat	$44.76	$44.83
Boards, 1x8, No. 1	35.87	36.45
Dimension, 2x 4, 16, No. 1, common	27.81	26.33
Dimension, 2x10, 16, No. 1, common	27.94	29.05
Timbers, 4x 4 to 8 x 8, No. 1	27.89	28.65
Timbers, 3x12 to 12x12, rough	38.52	37.85

DOUGLAS FIR MILL PRICES

	May	June
Flooring, 1x4, No. 2, clear flat	$33.00	$33.00
Boards, 1x8, 6 to 20, No. 1, common	16.50	16.50
Dimension, 2x 4, 16, No. 1, common	17.50	17.50
Dimension, 2x10, 16, No. 1, common	17.00	17.00
Timbers, 6x 6 to 8x 8, No. 1, common	23.00	23.00
Timbers, 10x10 to 12x12, rough	18.00	18.00

No changes have been noted in the prices of Portland cement which have continued uniform for a number of months. The table below gives prices per barrel in carload lots, not including packing.

New York	$2.15	Minneapolis	$2.42
Pittsburgh	2.19	Dallas	2.05
New Orleans	2.40	Denver	2.84
Chicago	2.20	San Francisco	2.31
Cincinnati	2.47	Montreal	1.80

News of the Month

The freight car loadings for the 24 weeks ending June 13 totaled 22,323,687 cars, as compared with 21,373,355 cars for the corresponding period in 1924, and 21,979,049 cars in 1923.

The Chicago, Milwaukee & St. Paul has been authorized by the Interstate Commerce Commission to abandon 18 miles of branch line between Wausaukee, Wis., and Girard Junction.

The Northern Pacific has applied to the Interstate Commerce Commission for permission to abandon operation on two branch lines in Montana, one running from Helena to Rimini, and the other from Clough Junction to Marysville, each of which is 12 miles in length.

The Interstate Commerce Commission has announced that in making its plans for completion of the primary valuation of the steam railroads in the country within the three-year period from July 1, 1925, for which work Congress recently made available a large appropriation, it has found it necessary to restrict the granting of requests of interested parties for postponements of hearings, arguments, etc. It is now recruiting the force of the Bureau of Valuation and is preparing to set for hearing a large number of protest cases.

The Federal District Court for the Eastern District of Missouri holds that the acquiring by a railroad of property for the purpose of collecting and holding water thereon to supply its engines is for a public use. To constitute an abandonment of such property there must be an intention to abandon, followed by an actual relinquishment of possession so that the property abandoned is left free and open to be appropriated by the next comer. The mere fact that all the land is not covered by water does not constitute an abandonment.

For the month of March, 1925, Class I railroads reported to the Interstate Commerce Commission a total of 1,722,275 employes, a decrease of 3,091, or 0.2 per cent, as compared with the employment for the previous month. The total compensation increased $14,305,872 or 6.4 per cent. This increase in compensation is due largely to the fact that March had three more working days than February. Compared with the returns for the corresponding month last year, the employment in March, 1925, shows a decrease of 2.2 per cent and the total compensation shows a decrease of 1.3 per cent.

The Class I railroads of the United States bought 98,130,000 cross ties during 1924, according to statistics compiled by the Bureau of Economics, or 13.9 per cent less than in 1923, while the volume of other lumber and timber showed a decline of 32 per cent. The detailed figures of the Bureau of Railway Economics follow:

	Board Feet	Value
Cross ties (number 98,130,000) approximate	3,925,200,000	$111,442,000
Switch and bridge ties	329,040,000	13,038,000
Lumber and timber	296,430,000	49,566,000
Other forest products	.....	6,826,000
		$180,872,000

Class I railroads, having a total mileage of 236,665 miles, had gross operating revenues in April amounting to $473,496,550, a decrease of $1,735,600 or two-fifths of one per cent, as compared with the same month last year, according to reports compiled by the Bureau of Railway Economics. Operating expenses totaled $370,623,400, a reduction of $7,203,500, or nearly two per cent under those for the same month last year. The net railway operating income for the first four months this year amounted to $270,104,080, which was at the annual rate of return of 4.38 per cent on property investment, as compared with $265,669,375, or 4.45 per cent for the same period last year. Maintenance of way expenditures totaled $68,091,819 virtually the same as in April last year.

A 20 per cent increase in livestock rates is proposed by the western railways in a brief filed with the Interstate Commerce Commission which outlines the reasons why such an increase is necessary. It points out that the general level of freight rates on the western railways is not sufficient to afford an adequate return upon the investment, that the rates have not increased proportionate to the increased cost of labor and materials, that the handling of livestock is expensive, and that the livestock industry is in a favorable economic condition so that an increase in rates would not impose an undue burden on this industry.

Authority to build a new line between Pittsburgh, Pa., and Easton has been requested in hearings before the Interstate Commerce Commission by L. F. Loree, president of the Delaware & Hudson as the representative of the E. H. Harriman estate. According to Mr. Loree, this line would be 100 miles shorter than any existing line between New York and Chicago and would cost $728,000 a mile, including equipment and interest during the period of construction. Strong objections to the construction of this line are being raised by representatives of the Baltimore & Ohio and the New York Central.

A "Safe Drivers Club" is being organized among the officers and employees of the Pennsylvania who are drivers of automobiles. The purpose of the club is to warn motorists to exercise proper care when approaching or driving over railroad-highway grade crossings, to prevent being struck by trains. To become a member one must agree to drive carefully, approach all railroad-highway crossings cautiously, and be assured that no train is approaching before crossing the tracks. A metal tag, bearing the slogan "Cross Crossings Cautiously," is furnished each member of the Safe Drivers Club, to be attached to the rear license tag of his car, as a reminder to following motorists.

The Louisville & Nashville, the Nashville, Chattanooga & St. Louis, and the Louisville, Henderson & St. Louis have taken out a joint policy for the protection of 60,000 employees with the Prudential Insurance Company. This policy will total aproximately $150,000,000. The policy became effective July 1, upon acceptance by 75 per cent of the employees. The amount of protection afforded each employee is based upon monthly earnings, the lowest being for $1,000 and the maximum for $3,000, with $1,000 additional benefits in the event of death from accident. Benefits also are provided for loss of limb or sight, and in cases of total permanent disability.

The Public Service Commission of New York on June 9 issued an order requiring that hereafter all automatic warning signals which may be installed at highway grade crossings on any railroad in the state shall be of the horizontal flashing type. This order will apply when new signals are installed or existing ones are replaced. The commission recommends the installation of the signals in the center of the highway upon each side of the railroad, whenever the physical conditions of the crossing will permit. It is held by the commission, in a memorandum, that when the signals are in the middle of the road the lamps are always within the range of automobile drivers' vision, whereas they might not be if the signals were at the side of the highway.

Labor News

Employees Must Pay For Coal

The United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers entered a complaint before the Labor Board arising out of the practice of supplying coal to employees on the Denver & Rio Grande Western. According to the employees' statement, section foremen and bridge and building foremen were furnished free coal prior to the passage of the Transportation Act of 1920, a concession which was largely made because many bridge and building and section foremen were required to maintain boarding camps in which the railroad definitely set the price which was to be charged for meals. However, in recent years the railroad has adopted the practice of charging the men for coal whether used in heating their own homes or for the heating and operation of the boarding camps. The answer made by the railroad was that the practice of furnishing foremen coal free of charge grew out of the fact that there were times when the railroad was permitted to remove mine run coal from the mines without being charged therefor by the operators. The employees, in presenting their claims before the board, asked that the railroad be ordered to refund the money deducted from wages for coal, but this was denied by the Labor Board.—Decision 3569.

Bridge Gang Laid Off Entitled to Investigation

A bridge gang on the Great Northern was laid off at Hillyard, Wash., on December 31, 1923, and another gang assigned to take care of its work. A portion of the men in the gang laid off were assigned to duty in the new gang, but the rest of the men were forced to exercise their seniority on the line of road. Upon complaint being made to the management the men were informed that their work was entirely unsatisfactory, whereupon the employees took the position that they were entitled to an investigation in accordance with the provisions of Rule 32 of the agreement. This the management refused to grant. The United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers made an ex-parte submission to the Labor Board which rendered the opinion that the procedure followed by the carriers was "most irregular" and that it would have been only just and reasonable to accord the employees an investigation as provided for in the rules. The decision of the Labor Board is that the railroad should have granted the investigation in accordance with the provisions of Rule 32.—Decision No. 3560.

Derrick Engineer Not Entitled to Expense Money

Complaint was made before the Labor Board concerning a derrick engineer who is employed on the Spokane division of the Great Northern, but is not assigned to any particular bridge and building crew, who contended that he was entitled to expenses while away from Hillyard, where he maintains his home, under an interpretation of Rule 54 of the agreement which reads: "Employees will be reimbursed for meals and lodging incurred while away from their regular headquarters or outfits, by direction of the management, whether on or off assigned territory, this rule not to apply to midday lunch customarily carried by employees or to employees temporarily transferred as covered by Rule No. 16." The position of the carrier was that the derrick engineer is in the same catagory as any member of the bridge and building crews with which he works for the reason that a bunk car accompanies the steam derrick, thereby affording him the same accommodations as are furnished the bridge and building crew. The decision of the Labor Board is that the derrick engineer shall be allowed expenses while away from Hillyard, unless he is provided with a place to sleep and is working with a bridge and building gang with which he can secure his meals without expense or have the car equipped not only with a bunk but also for meals.—Decision No. 3676. (This decision was passed by a vote of six to one, seven members being present. J. H. Elliott dissented on the ground that he sees no reason which would make a pile driver or derrick engineer a preferential employee.)

Personal Mention

General

W. H. Finley, president of the Chicago & North Western, and for many years bridge engineer and later chief engineer of that property, has resigned.

W. J. Backes, assistant general manager of the New York, New Haven & Hartford, with headquarters at New Haven, Conn., and formerly engineer maintenance of way of that road, has resigned and his position has been abolished.

I. A. Guier, whose appointment as supervisor of work equipment of the Atchison, Topeka & Santa Fe, eastern lines, with headquarters at Topeka, Kan., was reported in the June issue, was born on June 25, 1892, at Caney, Kan. He entered the service of the Atchison Topeka & Santa Fe in the mechanical department on January 11, 1909, as a turntable operator at Chanute, Kan., and was promoted to road fireman in October, 1910. In December, 1911, he was transferred to the bridge department, serving with a bridge gang on the Southern Kansas division, and from that date until 1918 he worked for both the bridge and building and track departments operating work equipment. In March, 1918, he became ditcher and steam shovel engineer, holding this position until the time of his recent promotion.

F. L. Burckhalter, assistant general manager in charge of the Northern district of the Southern Pacific, with headquarters at San Francisco, Cal., and an engineer by training, has been promoted to first assistant general manager, with jurisdiction over the entire system, and the same headquarters, a newly created position. **Thomas Ahern,** superintendent of the Sacramento division, with headquarters at Sacramento, Cal., and formerly a roadmaster, has been promoted to assistant general manager, with jurisdiction over the Northern district, and with the same headquarters, succeeding Mr. Burckhalter. Mr. Burckhalter was born at Truckee, Cal., in 1879, and graduated from the University of California in 1900. He entered railway service in August of that year as a rodman on the Southern Pacific, later being assigned to work as levelman and computor in a location survey party. He was promoted to assistant engineer in February, 1902, and was later promoted to roadmaster in the maintenance of way department. In March, 1906, Mr. Burckhalter was promoted to division engineer at Bakersfield, Cal., where he remained until November, 1908, when he was transferred to Los Angeles. He was promoted to district engineer at Portland, Ore., in November, 1911, and held that position until March, 1914, when he was promoted to superintendent of the Portland division. In September, 1918, Mr. Burckhalter was promoted to assistant general manager in charge of the Northern district, with headquarters at San Francisco, Cal. He held that position until his recent promotion to first assistant general manager, with jurisdiction over the entire system.

Engineering

Frank Manning has been appointed resident engineer on the Pere Marquette, in charge of grade separation work at Detroit.

The title of engineer maintenance of way on all divisions of the Cleveland, Cincinnati, Chicago & St. Louis has been changed to division engineer.

C. S. Kirkpatrick, chief engineer of the Gulf Coast Lines, has been appointed also chief engineer of the International-Great Northern, with headquarters at Houston, Tex.

A. E. Irving, tie inspector, has been appointed treating engineer at the Green Springs, W. Va., treating plant of the Baltimore & Ohio, succeeding **J. C. Alexander,** assigned to other duties.

Louis Yager, assistant chief engineer of the Northern Pacific, with headquarters at St. Paul, Minn., has taken over the duties of **S. J. Bratager,** assistant chief engineer, who retired on June 1, on account of ill health. **Lowry Smith,** assistant division engineer, with headquarters at St. Paul,

has been promoted to office engineer, with the same headquarters.

G. S. Duncan, assistant supervisor of bridges and buildings on the Salt Lake division of the Union Pacific, has been appointed assistant engineer, replacing **A. F. Daily,** assigned to other duties, the position of assistant supervisor of bridges and buildings having been abolished.

R. P. Parker, chief engineer of the San Antonio & Aransas Pass, has been appointed assistant engineer in the office of the chief engineer of the Southern Pacific, Texas and Louisiana Lines, at Houston, Texas. **Gale Oliver,** assistant engineer at Yoakum, Texas, has been appointed assistant division engineer on the Southern Pacific, with headquarters at San Antonio, Texas, these changes having been brought about by the consolidation of the San Antonio & Aransas Pass into the Southern Pacific System.

J. W. Gray, assistant engineer on the Yazoo & Mississippi Valley at Greenville, Miss., has been transferred to McComb, Miss., on the Illinois Central. **J. E. Murphy,** instrumentman on the New Orleans Terminal division of the Illinois Central at New Orleans, La., has been promoted to assistant engineer of the Yazoo & Mississippi Valley at Greenville, Miss., in place of Mr. Gray. **F. T. Craft,** assistant engineer in the office of the chief engineer of the Illinois Central at Chicago, has been transferred to Clinton, Ill., succeeding **W. J. Apperson,** who has been promoted to resident engineer on the Edgewood-Fulton line, succeeding **F. L. Phipps,** resigned to accept a position as superintendent with the States Contracting Company.

R. Hayes, structural engineer of the Southern, with headquarters at Washington, D. C., has been promoted to engineer maintenance of way, with headquarters at Chattanooga, Tenn. He was born on September 14, 1884, at Madbury, N. H. He was graduated from Dartmouth College and from the Thayer School of Engineering in 1908. He entered railway service three years later as an assistant engineer in the office of the chief engineer, maintenance of way and structurs, of the Southern. In 1916 he became resident engineer in charge of field construction of terminal facilities at Alexandria, Va., and Hayne, S. C. In 1917 he was appointed structural engineer, with headquarters at Washington, and remained in that position until the time of his recent promotion.

T. J. Skillman, chief engineer maintenance of way of the Northwestern region of the Pennsylvania, with headquarters at Chicago, has been appointed chief engineer of the newly created Western region, which is a consolidation of the Northwestern and Southwestern regions, with the same headquarters. **F. J. Stimson,** chief engineer maintenance of way of the Southwestern region, has been appointed assistant chief engineer maintenance of way of the new Western region, with headquarters at Chicago. **T. W. Pinard,** assistant chief engineer maintenance of way of the Northwestern region, has been appointed assistant chief engineer maintenance of way of the new Western region, with headquarters at Chicago. **D. B. Johnson,** formerly division engineer, with headquarters at Louisville, Ky., has been made assistant to the chief engineer maintenance of way of the Western region, with headquarters at St. Louis, Mo.

H. F. Hamilton, whose promotion to assistant to the chief engineer of the Great Northern, with headquarters at St. Paul, Minn., was reported in the June issue, was born on December 14, 1870, at Madison, Wis. and received his education at the University of Wisconsin. Prior to entering the service of the Great Northern on January 2, 1894, he was employed in the engineering departments of the Chicago, Milwaukee & St. Paul, the city of Milwaukee and the Green Bay & Western. From January 2, 1894, to April, 1901, he served as rodman, transitman and assistant engineer, respectively, on the Great Northern, on the latter date being appointed engineer in charge of heavy construction work in Montana. In January, 1905, he became resident engineer of the Central district, with headquarters at Havre, Mont., and in January, 1913, was transferred to the Eastern district, with headquarters at St. Paul, Minn. From November, 1918, until February, 1919, he served as principal assistant engineer at St. Paul, at which time he was promoted to district engineer, the position he was holding at the time of his recent promotion.

L. W. Althof, whose promotion to division engineer of the Idaho division of the Oregon Short Line, with headquarters at Pocatello, Idaho, was reported in the May issue, was born on July 31, 1886, at Oakland, Cal., and entered railway service in December, 1908, as a draftsman on the Southern Pacific, where he remained until October, 1910. In May, 1911, he became assistant engineer on the Oregon Short Line, and from that date until October, 1916, served in various capacities in the track and bridge and building departments. From October, 1916, to February, 1918, he served in the maintenance of way department of the Union Pacific as assistant engineer on special investigation work, and in the construction of reinforced concrete snow sheds in Wyoming. He left railway service in February, 1918, to become superintendent of hull construction for the Merchants Shipbuilding Corporation, where he remained until April, 1923, when he again entered railway service as assistant engineer on the Oregon Short Line, which position he was holding at the time of his recent promotion.

C. A. Knowles, who has been appointed valuation engineer of the Chesapeake & Ohio, with headquarters at Richmond, Va., was born in Buffalo, N. Y., on February 23, 1883, and later graduated from the Niagara Falls High School. He began his engineering work in April, 1902, as a rodman on maintenance of way work, and from that time until 1910 he was employed for the major part on railroad location and construction in various capacities from rodman to resident and assistant engineer in charge of construction. From 1910 to 1912 he was employed as assistant engineer in connection with municipal construction and maintenance work and with construction work for the State of Connecticut, for the most part highway and railroad facilities. In 1912 he engaged in railroad work in connection with the design and standardization of track and structural details, and for a time was engineer in charge of railroad location work in Central America. From 1914 to 1924, except for a period during 1918 and 1919, when he was with the United States Army Engineers, he was with the Engineering Section, Bureau of Valuation, Interstate Commerce Commission. Until his recent appointment Mr. Knowles was assistant valuation engineer of the Chesapeake & Ohio.

C. A. Knowles

A. C. Harvey, assistant chief engineer of the Nickel Plate and Lake Erie and Western district of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, has been promoted to chief engineer, with the same headquarters, succeeding J. K. Conner, deceased. **J. C. Wallace,** district engineer of the Lake Erie and Western district, with headquarters at Indianapolis, Ind., has been promoted to assistant chief engineer of the Nickel Plate and Lake Erie and Western districts, with headquarters at Cleveland, succeeding Mr. Harvey. **G. H. Tinker,** bridge engineer of the Nickel Plate district, with headquarters at Cleveland, has been given extended jurisdiction to include also the Lake Erie and Western district. **F. S. Hales,** engineer of track of the Nickel Plate district, with headquarters at Cleveland, has also been given extended jurisdiction to include the Lake Erie and Western district. **C. R. Wright,** division engineer on the Nickel Plate district, with headquarters at Cleveland, Ohio, has been promoted to district engineer of the Nickel Plate district, with headquarters at Indianapolis, Ind., succeeding Mr. Wallace. **W. H. Burrage** has been appointed division engineer at Cleveland, succeeding Mr. Wright. Mr. Harvey was born on December 24, 1883, at Mansfield, N. Y.,

and was graduated from Purdue University in 1908. Before his graduation from college he had been employed as a rodman and draftsman in the engineering department of the New York, Chicago & St. Louis, and he returned to that company in June, 1908, as a rodman and transitman on station ground surveys between Cleveland, Ohio, and Buffalo, N. Y. In March, 1909, Mr. Harvey was promoted to assistant engineer on a grade crossing elimination project where he remained until March, 1910, when he was placed in charge of a double track survey in New York and Pennsylvania. A few months later he was placed in charge of track elevation at Grand Crossing, Ill., and he continued there until June, 1916, when he was put in charge of field work on a grade crossing elimination project in Cleveland. Mr. Harvey was promoted to field engineer at Cleveland, Ohio, in January, 1917, and in September, 1918, was promoted to engineer of grade crossing elimination, in charge of the west side grade crossing elimination at Cleveland. He was promoted to assistant chief engineer of the Nickel Plate district in December, 1921, and in August, 1924, was given jurisdiction over the Lake Erie and Western district also. He continued in that capacity until his recent promotion to chief engineer of the Nickel Plate and Lake Erie and Western districts.

Track

E. H. Lewis, assistant engineer on the Illinois Central at McComb, Miss., has been promoted to track supervisor at Jackson, Miss., succeeding **O. A. Graham,** resigned.

Sam Moore, section foreman on the Kansas, Oklahoma & Gulf, with headquarters at Hoffman, Okla., has been promoted to roadmaster on the Second district, with headquarters at Muskogee, Okla. Mr. Moore was born on July 10, 1890, at Gilbert, Ark., and entered railway service on August 10, 1906, as a laborer on the Missouri & North Arkansas. He was promoted to section foreman in 1912, holding this position continuously until 1921 except for various intervals when he was employed as extra gang foreman and on one or two occasions as acting roadmaster. In 1923 he entered the service of the Kansas, Oklahoma & Gulf as a section foreman, which position he was holding at the time of his recent promotion.

J. N. Sagester, whose promotion to track supervisor on the Pennsylvania, with headquarters at Logansport, Ind., was reported in the June issue, was born on February 4, 1888, at Walton, Ind., and entered railway service in April, 1903, as a trackman on the Pennsylvania a position he held until May 6, 1910, when he was made sub-foreman of an extra gang. On November 4, 1910, he was promoted to track foreman, holding this position until June 1, 1917, when he was advanced to extra gang foreman. On March 31, 1918, he was again made a track foreman and was holding this position at the time of his recent promotion to track supervisor of the Logansport division, with headquarters at Logansport, Ind.

H. I. Hoag, supervisor of track on the New York Central, with headquarters at West Albany, N. Y., has been promoted to general inspector of track with headquarters at New York, succeeding **M. E. Egan. C. H. Morse,** supervisor of track, with headquarters at Clearfield, Pa., has been transferred to Kingston, N. Y., to succeed **A. A. Johnson,** transferred to West Albany to succeed Mr. Hoag. **J. F. Kelly,** assistant division engineer, has been appointed supervisor of track at Clearfield to succeed Mr. Morse. Mr. Hoag entered railway service in 1903 as a member of the engineering department of the New York Central at Albany, being promoted to assistant supervisor of track, with headquarters at West Albany in 1906. In 1908 he was promoted to supervisor of track with headquarters at Clearfield, Pa., being subsequently transferred to Kingston, N. Y., and to West Albany, where he was serving at the time of his recent promotion to general inspector of track.

A. F. Frendberg, assistant roadmaster on the Lousiville & Nashville, has been promoted to roadmaster, with headquarters at Ravenna, Ky., following the transfer of **R. Lavon,** roadmaster at Ravenna, to LaGrange, Ky., succeeding **C. J. Elbrick,** transferred to Evansville, Ind., in place of **T. Robson,** retired. Mr. Frendberg was born on February 17, 1882, at Ishpeming, Mich., and received his education at the University of Wisconsin. He entered railway service in June, 1903, as an instrumentman on the Chicago & Alton, where he remained until July, 1904, when he became assistant engineer on the Lousiville & Nashville, holding this position until October, 1918, when he was promoted to assistant to the superintendent. He held this position until January, 1921, when he became assistant roadmaster, which position he was holding at the time of his recent promotion.

Bridge and Building

G. M. Haley, assistant supervisor of bridges and buildings on the Los Angeles division of the Union Pacific, has been promoted to supervisor of bridges and buildings on the Salt Lake division, succeeding **R. R. Bishop,** who has been assigned to other duties. The position of assistant supervisor on the Los Angeles division has been abolished.

George C. Fullick, bridge and building foreman on the Southern Pacific, Texas and Louisiana Lines, Victoria division, has been promoted to supervisor of bridges and buildings, with headquarters at Victoria. **W. R. Hale,** bridge and building foreman on the Austin division, has been promoted to bridge and building supervisor of the same division, with headquarters at Austin, Texas.

E. R. Reed, bridge and building foreman on the Eastern division of the Minneapolis & St. Louis, has been promoted to bridge and building supervisor on the Central division, with headquarters at Ft. Dodge, Iowa, following the resignation of **L. O. Nelson.** Mr. Reed was born in Sweden in 1885 and was employed on the Iowa Central, now a part of the Minneapolis & St. Louis, as a section laborer during school vacations. In May, 1903, he entered permanent employment as a laborer in a bridge and building gang, later becoming bridge and building carpenter and subsequently assistant foreman. On May 1, 1912, he was promoted to foreman of water service and a year and a half later was placed in charge of a bridge and building gang as foreman, with headquarters at Hampton, Iowa. He continued in this position until March 1 of the present year, when he was promoted to supervisor of bridges and buildings.

Purchasing and Stores

G. M. Betterton, chief clerk in the purchasing department of the Southern Pacific at San Francisco, Cal., has been promoted to assistant purchasing agent, with the same headquarters. This is a newly created position.

N. M. Rice, general purchasing agent of the New York, New Haven & Hartford, with headquarters at New Haven, Conn., has been elected vice-president in charge of purchases and stores, with the same headquarters.

W. E. Lefaivre, purchasing agent of the Denver & Rio Grande Western, with headquarters at Denver, Colo., has been appointed general storekeeper, with the same headquarters, succeeding W. B. Hall, promoted to purchasing agent.

Obituary

Julius Kruttschnitt, who retired as chairman of the executive committee of the Southern Pacific on June 1, died in a New York hospital on June 15, as the result of a heart attack which he suffered following a minor operation. A sketch of Mr. Kruttschnitt's railroad career, which was written in connection with his recent retirement, was published in the May issue, page 207.

Edwin O. Wiggin, track supervisor on the Portland division of the Boston & Maine, with headquarters at Rochester, N. H., died on May 24. **John Talbot,** track supervisor on the Terminal division, with headquarters at Boston, Mass., died on June 9. Mr. Wiggin was born at Union, N. H., on January 20, 1862. He entered the service of the Boston & Maine in 1885 as a trackman and was promoted to supervisor on January 26, 1918, the position he held at the time of his death. Mr. Talbot was born in Ireland on December 22, 1854, and entered the employment of the Boston & Maine as a trackman in 1873, being promoted to track supervisor in 1905.

Construction News

The Atchison, Topeka & Santa Fe has awarded a contract to the T. S. Leake Construction Company, Chicago, for the construction of a two-story office building, 36 ft. by 50 ft., and a one-story warehouse, 50 by 300 ft., in Chicago. A contract has also been awarded to Sprague & Nicely for the construction of 58 miles of line, west of Elkhart, Kan. Sharpe & Fellows, who have been awarded the general contract for a line from Dowd, N. M., have sublet the construction of stations, section houses, agents' residences and stockyards to N. D. Leaverton, Lubbock, Tex. This company also sublet a contract to Roberts & Prentice Construction Company covering grading and construction of 70 miles of line between Lubbock, Texas, and Dowd, New Mexico. This company has given a subcontract for the grading of a new line from Doud, Tex., 65 miles west to the Texas-New Mexico state line to the R. & P. Construction Company, Houston, Tex.

The Santa Fe has prepared plans for the construction of a passenger and freight station at Monrovia, Cal., to cost approximately $75,000. The Sante Fe Employees Hospital Association has awarded a contract to C. A. Fellows & Company for an addition to the employees hospital at San Bernardino, California.

The Atlantic Coast Line has awarded a contract to Hugger Brothers, Montgomery, Ala., for the construction of shop buildings at Uceta, Fla., to cost approximately $180,000. This company has filed an application with the Interstate Commerce Commission for the construction of an extension in Collier county, Fla., from a connection with its branch lines at Immokalee to Deep Lake, a distance of 27 miles.

The Baltimore & Ohio has awarded the following contracts: To the Pittsburgh-Des Moines Steel Company, for five water treating plants on the Pittsburgh Terminal division; to the Vang Construction Company, Cumberland, Md., for masonry for four bridges to cost $44,000, and to the Empire Construction Company, Baltimore, Md., for masonry for four bridges at $33,000. A contract has also been awarded to the Construction Company, Chicago, covering the erection of the superstructure of a bridge crossing the Cheat river at Point Marion, Pa. Another contract placed by the same road with Pittsburgh Construction Company, Pittsburgh, Pa., covers the remodeling of superstructure in the bridge crossing Pine creek, at Etna, Pa., involving about 110 tons of steelwork. Bids were closed on June 26 for the construction of a water treating plant at Lumberport, West Va.

The Beaver, Meade & Englewood is the subject of a tentative report by Attorney-Examiner Boles and Engineer-Examiner Gray recommending a finding by the Interstate Commerce Commission that the public convenience and necessity have not been shown to require the construction of a proposed extension from Hooker, Okla., to Des Moines, N. M., 175 miles. The commission has allowed an extension of time from June 30, 1925, to December 31, 1926, in which the company may complete an extension from Forgan to Hooker, Okla., 39.2 miles, which was authorized by an order of the commission on January 29, 1924.

The Canadian Pacific has awarded a contract to the Manitoba Bridge Company, Winnipeg, Man., for the erection of a 100,000-gal. steel water tank at Eagle River, Man., and a tank of the same size at Molson, Man. A contract has been awarded to the Horton Steel Company, Bridgeburg, Ont., for the erection of a 100,000-gal. steel water tank at Souris, a similar tank at Broadview, and for an 80,000-gal. water tank at Elkhorn.

The Central of Georgia has awarded a contract to the Claussen-Lawrence Construction Company, Augusta, Ga., for the construction of two store buildings at Macon, Ga., to cost approximately $140,000.

The Chicago, Burlington & Quincy has awarded a contract to Harvey Wood, Aurora, Neb., for the construction of a nine-stall addition to the roundhouse at Lincoln, Neb. This company is accepting bids for the construction of a brick power house 50 by 96 feet, and the moving and resetting of four boilers at Galesburg, Ill.

The Chicago, Milwaukee & St. Paul has awarded a contract for H. C. Strucken, St. Paul, Minn., for the construction of an engine house, shops, power house and foundations for other structures for its engine terminal at St. Paul, Minn. A contract has been let to the Ogle Construction Company for a coaling station, to the McCarhy Well Company for a well, to the Pittsburgh Bridge & Iron Company for a water tank, to Smith & Chabot for foundation pile driving, and to Peterson, Shirley & Gunther for grading.

The Chicago, Rock Island & Pacific has recently appropriated approximately $1,000,000 for the construction of 13 coaling stations, 18 water treating plants, 11 wash-out plants and 22 cinder conveyors. The coaling stations will be erected at Washington, Iowa, Council Bluffs, Marengo, and other points. A new passenger station is to be constructed at Tucumcari, New Mex., which, with other improvements on the El Paso division, will cost $310,000. The construction of 42 miles of second track from Latimer, Kan., to McFarland, at an estimated cost of $3,700,000, has now been definitely authorized as has the construction of a branch line from Billings, Okla., to Ponca City to cost $990,000.

The Cleveland, Cincinnati, Chicago & St. Louis will soon take bids for the construction of second track between Pana, Ill., and Mattoon, a distance of 60 miles. Plans have been completed. Plans are also being prepared for the construction of a 50-ft. by 350-ft. brick and concrete freight station at Dayton, Ohio.

The Detroit, Toledo & Ironton has awarded a contract to the Grand-Boulton Company, Columbus, Ohio, for grading and masonry work in connection with the construction of second track from Flat Rock, Mich., to Durban, a distance of 17 miles.

The Erie will convert its Monmouth street, Jersey City, coach yard into a team track yard and will build a new coach yard at Weehawken, N. J. The company has acquired a portion of the warehouse property adjoining its right of way in Jersey City, owned by the Safety Car Heating & Lighting Company. It has other large holdings in the vicinity and plans ultimately an extensive terminal warehouse development on the property, which is located at the New Jersey entrance to the Hudson river vehicular tunnels, now nearing completion.

The Golden Belt has been denied its petition before the Interstate Commerce Commission for permission to build a line from Great Bend, Kan., northward to Hays, with a short branch—a total distance of 108 miles.

The Grand Trunk Western jointly with the Indiana Harbor Belt and the Chicago River & Indiana, subsidiaries of the New York Central, has proposed to the City of Chicago to elevate their tracks in that city from the end of the present elevation, at Forty-ninth street, west to Central Park avenue, and then south to beyond Sixty-seventh street. Plans provide for 10 subway crossings, the entire project to cost between $5,000,000 and $6,000,000.

The Great Northern has applied to the Interstate Commerce Commission for authority for the construction of an extension from Scobey to Opheim Mont., 50 miles.

The Illinois Central has awarded a contract to the Railroad Water & Coal Handling Company, Chicago, for the construction of a water treating plant and pumping station having a capacity of 50,000 gallons per hour at Harvey, Illinois. This company is asking for bids for a brick and steel roundhouse and machine shop and a number of small shops at Sioux City, Ia. A contract has been awarded to Coomer & Small for foundations.

The Jefferson & Northwestern has applied to the Interstate Commerce Commission for authority for an extension from Marietta to Naples, Tex.

The Kansas City Terminal has awarded a contract for the construction of a brick and concrete stores building in Kansas City, Mo., to cost approximately $35,000.

The Louisville & Nashville has been granted an extension from June 3, 1925, to December 31, 1925, by the Interstate Commerce Commission of the time limit within which this

company must file its application for the construction of a line connecting its McRoberts line and its Harlan county branch with the Carolina, Clinchfield & Ohio, under the terms of the commission's order permitting the lease of the Clinchfield by the L. & N. and the Atlantic Coast Line. This company, in conjunction with the Nashville, Chattanooga & St. Louis, contemplates the construction of a union passenger station at McKenzie, Tennessee.

The Mississippi & Schoona Valley has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a line from Bryant to Bruce, Miss., 22 miles, to be operated in conjunction with the Illinois Central.

The Missouri Pacific has awarded a contract to the Kellerman Contracting Company, St. Louis, Mo., for the construction of a 10-stall, reinforced concrete and brick roundhouse at St. Louis, Mo., to cost $90,000, as reported in the June issue. A contract has been awarded to Jerome A. Moss, Chicago, for the construction of an 8-stall roundhouse at Osawatomie, Kan. Bids were closed on June 26 for a 6-stall roundhouse at Bush, Ill. The construction of ten miles of second track between Cypress Junction, Ark., and Benton, has been authorized. The project will cost approximately $395,000.

The Mobile & Ohio has awarded a general contract for the construction of the second unit of repair facilities at Jackson, Tenn., at a cost of $1,250,000, to Dwight P. Robinson & Company, New York. The buildings to be constructed include a locomotive repair shop 525 ft. by 205 ft., store room and office building 220 ft. by 60 ft., and a locker building 100 ft. by 50 ft.

The Monongahela has awarded a contract to the H. K. Ferguson Company, Cleveland, Ohio, for the construction of additions to its Brownsville, Pa., shops to cost approximately $100,000.

The Naples, Seaboard & Gulf has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a line to be operated by the Seaboard Air Line from Naples, Fla., to Fort Myers and the south bank of the Estero river, 35 miles.

The New York Central has awarded a contract for the elimination of a grade crossing at Main Street, Suspension Bridge, N. Y., to cost approximately $318,000, to the Walsh Construction Company, Davenport, Iowa.

The New York, New Haven & Hartford has authorized the construction of a new classification yard at Worcester, Mass., the addition of a number of tracks to its classification yard at Cedar Hill (New Haven) Conn., and grading in connection with additional tracks to be laid in its Harlem river freight yard, New York City.

The New York, Westchester & Boston has been granted an order by the New York State Public Service Commission permitting it to abandon its proposed line from White Plains, N. Y., eastward to Danbury, Conn., and north to Brewster, N. Y. The New York, New Haven & Hartford was at the same time authorized to build two additional tracks from Larchmont, N. Y., to Mamaroneck, the tracks to be leased to the Westchester company as part of a plan to extend its operations eventually to Port Chester.

The Northern Pacific has awarded a contract to A. Guthrie & Co., St. Paul, Minn., for the grading in connection with the construction of coach yard facilities at St. Paul. A contract for the construction of buildings has been awarded to the Walter Butler Company, Inc., St. Paul. The track work will be done by company forces. The project includes the construction of a commissary and appurtenant buildings and a coach yard with capacity for approximately 150 coaches. The total cost of the improvement is estimated at $850,000.

The Pennsylvania has awarded a contract to cost approximately $100,000 preparatory to the erection of a new American Railway Express building at Sunnyside Yard, Long Island City, N. Y., to Henry Steers, Inc., New York.

The Quincy & Northeast (Electric) has filed incorporation papers with the recorder of deeds at Quincy, Ill., for a line to run from Quincy, Ill., to Monmouth, approximately 70 miles.

The Reading has awarded a contract to the Curtis-Grindrod Company, Philadelphia, Pa., covering the construction of tunnels, platforms, shelters, stairways, etc., in connection with the new union station at Bethlehem, Pa. A contract has also been awarded to the Hughes-Foulkrod Company, Pittsburgh, Pa., covering the construction of a freight car repair shop at Reading, Pa.

The Richmond, Fredericksburg & Potomac has authorized the construction of an underpass to carry its southbound freight track under the northbound and southbound passenger tracks north of Potomac Yard. The work will involve grading and masonry for one double-track undergrade through girder bridge, estimated to cost approximately $150,000. Plans are not yet in detail shape for submission to contractors. The construction of a double-track reinforced concrete arch bridge over the Rappahannock river at Fredericksburg, Va., replacing a single-track steel structure has also been authorized.

The St. Louis-San Francisco has received the approval of the Railroad Commission of Arkansas of plans for the construction of a union passenger station at Hoxie, Ark., jointly with the Missouri Pacific, to replace the building recently destroyed by fire. The new station will be of brick, with concrete floor. Bids are now being requested.

The South Georgia has applied to the Interstate Commerce Commission for authority for an extension from Perry to Deadman's Bay, Fla., 35 miles.

The Southern, the Alabama Great Southern, the Louisville & Nashville and the Seaboard Air Line have agreed with the City of Birmingham, Ala., to construct a viaduct to carry Twenty-fourth street, in that city, over the railway companies' tracks. The work will be undertaken by the Southern, acting as agent for itself, the other railways and the City of Birmingham. The cost is estimated at $350,000. Plans have been prepared by this company and presented to the Alabama Public Service Commission for approval for the erection of a station at Fourth street, Anniston, Ala.

The Southern Pacific has made application to the Interstate Commerce Commission for authority to construct a 40-mile extension from Klamath Falls, Ore., in a southeasterly direction to Cornell, Cal. This is one step in the Southern Pacific plan to construct a standard gage connection between the Klamath Falls region and the Central Pacific's main line across Nevada, so as to provide a direct rail route between the northwest and the inter-mountain region and also between southern Oregon and the east. The application for permission for the San Antonio & Aransas Pass, a subsidiary, to construct an extension from Falfurrias, Texas, to the international boundary line at a point on the Rio Grande, includes also provision for the construction of a bridge across the Rio Grande at Hidalgo, Texas, connecting in Mexico with a branch line of the National Railways of Mexico.

The Railroad Commission of California having granted permission for the Southern Pacific to lease the 16½-mile narrow-gage line of the Lake Tahoe Railroad & Navigation Company, the work of reconstructing the short line as a standard gage railroad will be undertaken soon. The Interstate Commerce Commission has issued a certificate of public convenience and necessity authorizing this company to construct an extension of its Sutter Basin branch for a distance of 5.6 miles from a point near Hinsdale, Cal., in a northeasterly direction. The cost of the construction is estimated at $331,054. The line will reach a rich agricultural area.

The Southern Pacific is reported to be contemplating the construction of a passenger station at Waco, Texas, to be used jointly with the San Antonio & Aransas Pass.

The Tampa Southern, a subsidiary of the Atlantic Coast Line, has been authorized by the Interstate Commerce Commission to build a line from Sarasota, Fla., in a southeasterly direction to a connection with the Atlantic Coast Line at Fort Ogden, a distance of 39 miles. Construction cost is estimated to average about $23,000 per mile.

The Wabash awarded a contract to Roberts & Schaefer Company for the construction of a reinforced concrete locomotive coaling and sanding plant at St. Louis, Mo., a 300-ton four track installation at Bement, Ill., and a 200-ton coaling station at Tracy, Iowa.

Supply Trade News

General

The Truscon Steel Company is planning an addition to its plant in Youngstown, Ohio.

The E. A. Lundy Company, Pittsburgh, Pa., has opened an office at 611 Harrison building, Philadelphia, Pa., with **P. M. Etters** as district manager.

The Clark Car Company has appointed the **Engineering Products Company**, Rialto building, San Francisco, Cal., its Pacific Coast representative.

The Hattiesburg Creosoting Company has changed its name to the **Gulf States Creosoting Company.** The company recently completed a new plant at Meridian, Miss. It also has plants at Hattiesburg, Miss., and at Slidell, La.

The American Manganese Steel Company has opened a new plant at Los Angeles, Cal., which gives the company facilities for producing about 25,000 tons of manganese steel castings annually. The new plant will begin production at the rate of 100 tons a month.

J. W. Cane & Company, Houston, Tex., have been appointed southwestern representative of the **Chicago Railway Equipment Company**, the **Scullin Steel Company, Mudge & Company**, the **Globe Steel Tubes Company** and the **Vulcan Iron Works.**

The American Creosote Works, Inc., New Orleans, La., and the **Savannah Creosoting Company, Inc.**, Savannah, Ga., have located their eastern and foreign sales office at 1728 Whitehall building, New York City, in charge of **Stanley H. Rose**, manager of sales.

Personal

George T. Willard, representative of the Rail Joint Company, has resigned to become a sales representative of the **Railroad Supply Company.** His headquarters will be in Chicago.

George T. Sinks, district manager of the Industrial Works, with headquarters in New York, has been appointed district sales manager of the **McMyler Interstate Company**, with headquarters in New York.

W. G. Hume, assistant to the sales manager of the **Keystone Steel & Wire Company**, Peoria, Ill., has been appointed sales manager, succeeding **H. G. Moore**, who has resigned, effective in July, after holding this position for 12 years.

Marshall A. Carlton has been appointed Baltimore representative of the **Verona Tool Works**, Pittsburgh, Pennsylvania, with headquarters in the Munsey building, Baltimore, Md.

L. R. Meisenhelter has been appointed by the Director of Exhibits, of the Sesquicentennial Exposition, Philadelphia, to take charge of assembling exhibits in the departments of transportation, machinery, mines and metallurgy, and manufactures.

J. I. Vincent, for several years representative of the Straus-Bascule Bridge Company, is now connected with the railroad sales department of the **Lewis Asphalt Engineering Corporation**, New York, successors to Gardiner & Lewis, Incorporated.

Heman Ely, vice-president and treasurer of the Timken **Roller Bearing Company**, Canton, Ohio, has retired from active connection with the company. Mr. Ely became associated with the Timken Company in 1909 as secretary; in 1916 he was also appointed treasurer, and since 1920 served as vice-president and treasurer. **H. J. Porter**, general sales manager has been promoted to vice-president in charge of sales, **L. M. Klinedinst**, assistant to Mr. Porter, has been appointed general sales manager of the industrial division.

John H. Hayward, vice-president and treasurer of the Hayward Company, New York, died in Teaneck, N. J., on June 14. Mr. Hayward was born on April 7, 1847, in New York. After graduating from a military academy he served with the Manhattan Savings Institution, and later went into the produce business. Mr. Hayward subsequently became general manager of the Manhattan Dredging & Elevating Company, which was organized to carry on a general contracting business. Later he organized the Hayward Company for the manufacture of orange peel buckets and other types of buckets.

J. R. McGinley, president of the Duff Manufacturing Company, has been elected chairman of the board, **Thomas A. McGinley**, vice-president and general manager, has been elected president, succeeding J. R. McGinley, and **E. M. Webb** has been made general manager, succeeding Thomas A. McGinley. **P. G. O'Hara**, formerly with the Galena Signal Oil Company, has been appointed vice-president in charge of sales in the eastern sales division, with headquarters at 250 Park avenue, New York, while **C. N. Thulin**, sales representative at Chicago, has been appointed vice-president in charge of the western sales division, with headquarters in the Peoples Gas building, Chicago.

E. I. du Pont de Nemours & Company, Wilmington, Del., have consolidated the eastern and western railway sales departments and **P. G. Kennett**, manager of the paint and varnish department, with headquarters in Chicago, has been appointed manager of railway sales, with headquarters in Chicago and New York. **A. V. Marti**, assistant to the sales manager, with headquarters in Chicago, has been appointed assistant manager of railway sales, with the same headquarters. **Harvey Spangenberg**, chief clerk to the sales manager, with headquarters at Philadelphia, Pa., has been appointed assistant to the manager of railway sales, with headquarters at Parlin, New Jersey.

Mr. Kennett was born in St. Louis, Mo., on February 22, 1875. He attended Staunton Military Academy, Staunton, Va., and the Christian Brothers College, St. Louis, Mo. Mr. Kennett entered railway service in the stores department of a southern road and later was employed in the stores and purchasing departments of several railroads in the south and southwest. He entered the employ of the Flint Varnish Works, Flint, Mich., in 1910 as a salesman, which position he held until October, 1918, when the du Pont Company acquired the Flint Varnish Works. He continued as a salesman for the du Pont Company at Flint, Mich., until May, 1920, when the Chicago Varnish Company was acquired and he was transferred to Chicago. In December, 1921, he was promoted to sales manager of railway sales of the Chicago district and in April, 1922, he was appointed sales manager of railway and industrial sales of the Chicago district, which position he has held until his recent appointment.

P. G. Kennett

William H. Reaves has been appointed southwestern sales agent, with headquarters at 1169 Arcade building, St. Louis, Mo., in charge of sales of lock washers, nut locks and spring washers for the **National Lock Wash Company**, Newark, N. J. Mr. Reaves was formerly with the Chicago, Rock Island & Pacific at Chicago and later with the same railroad at Little Rock, Ark. He was subsequently appointed southwestern sales agent for the P. & M. Company, with headquarters at St. Louis. In January, 1924, he became secretary and treasurer of the Railway Equipment Company, St. Louis, and on April 1, 1925, left that company to organize the William H. Reaves Supply Company. Mr. Reaves will also handle the accounts of the **P. & M. Company and the Maintenance Equipment Company**, in St. Louis and the southwest.

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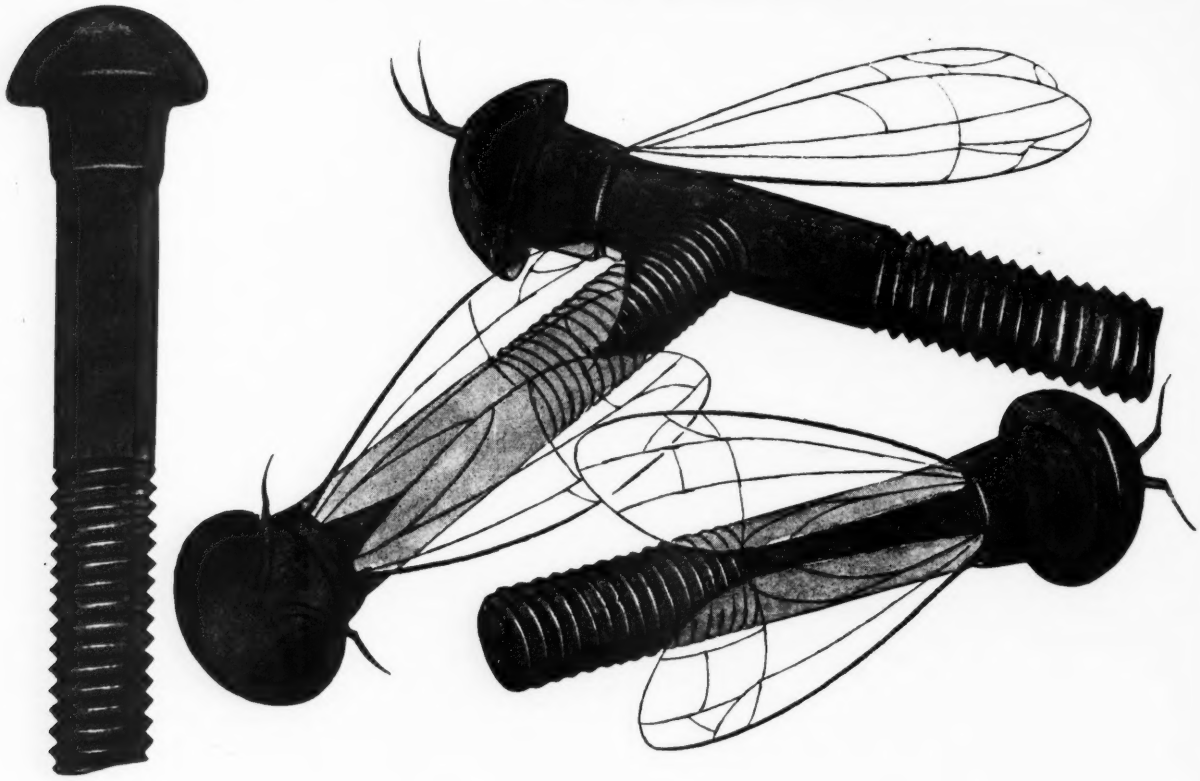
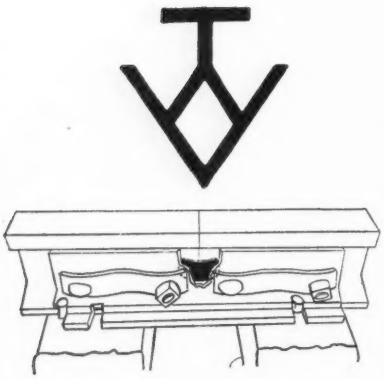


Drone Bolts

IN a four-bolt joint, suppose one bolt is considerably tighter than the other three. What happens?

That one bolt does the work of all four. The rest are idle. Each blow from the rolling load is delivered upon the tightest bolt which inevitably stretches under the strain.

Verona Rail Joint Springs eliminate drone bolts. They offer a definite measure of tightness. When the springs are compressed until a wire nail used as a gauge can just be inserted under their crowns, the bolts are equally tight and the blow from the rolling load is evenly distributed among them.



But even in the event of careless tightening, Verona Rail Joint Springs cushion, absorb and equalize the shocks and by coupling the bolts in pairs prevent the overloading of any one bolt.

VERONA TOOL WORKS Pittsburgh San Francisco New York New Orleans Chicago Washington Boston St. Paul St. Louis Denver